THE AUTOMOBILE

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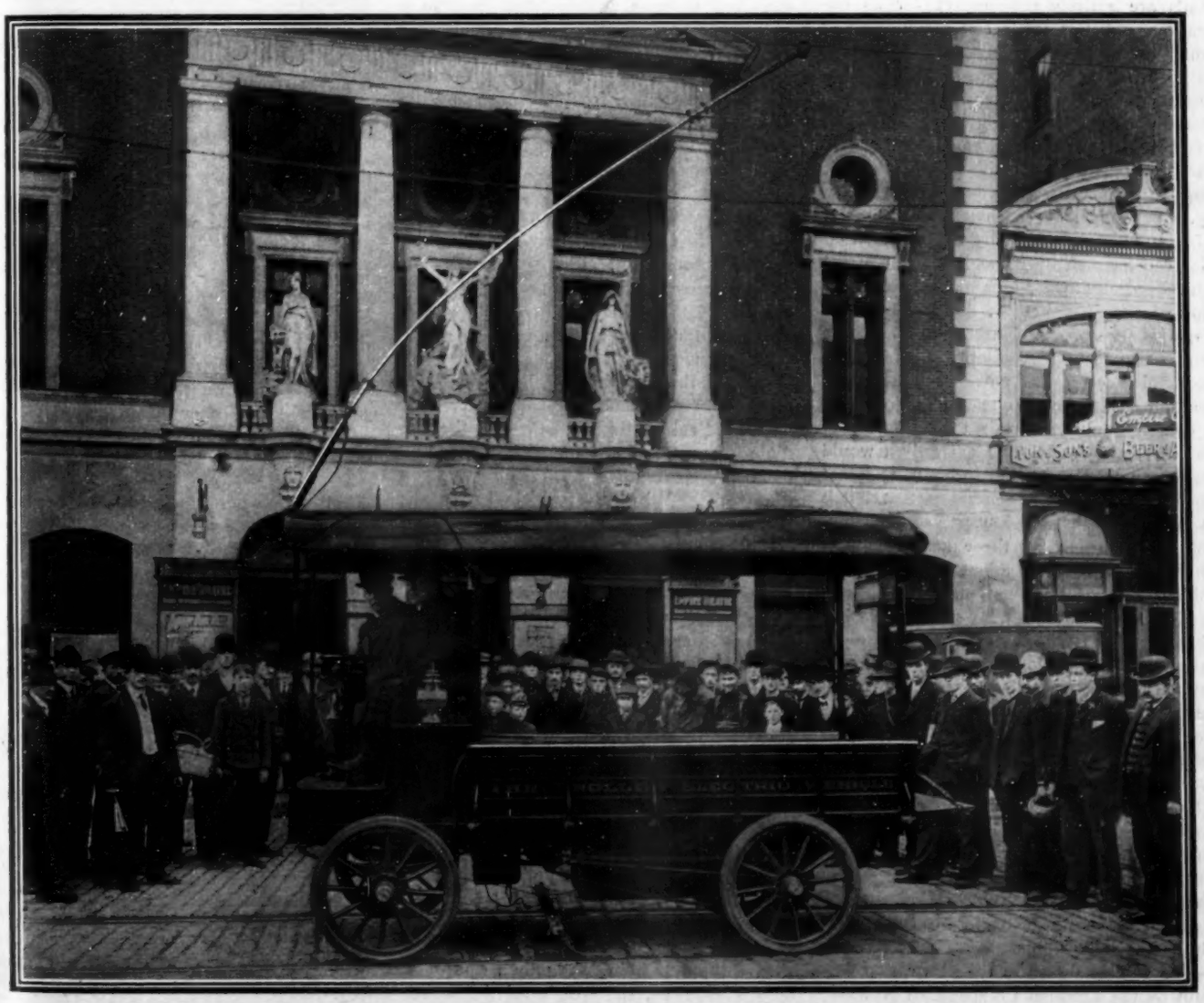
ELECTRIC VEHICLES FOR SEMI-PUBLIC SERVICE.

PHILADELPHIA, Dec. 11.—A departure in the construction and operation of automobile industrial vehicles that may soon open up a new and very broad field of usefulness for electric vehicles is illustrated in the accompanying photograph. Briefly, the express wagon is equipped with trolley pole and special electric motor for using the high-power current from the overhead feed wires of the street railway companies, in the streets where these wires exist, and is also provided with the storage battery and low-power motor ordinarily employed in electrically propelled automobiles, so that it can be operated under self-contained power in streets where there are no street car wires.

The system, which is the invention of



ELECTRIC WAGON, BUILT TO RUN ON CURRENT FROM TROLLEY WIRE AND INDEPENDENTLY ON STORAGE BATTERY CURRENT.

Russell Thayer, of Philadelphia, was designed primarily for use in connection with local package delivery and express business. Its use is not restricted to these purposes, however, the fact having been demonstrated that it is equally effective for a repair or emergency wagon for trolley and electric light companies in large cities, for a sight-seeing car ambulance, police patrol and for post-office service. Rather exhaustive tests in this and other cities have demonstrated its general adaptability in the collection and delivery of mail and have shown safety, reliability and a large percentage of time saved, it is claimed.

It is probable that extensive use could be made of passenger 'busses built on this system, by street car companies for extending their service into sections of cities where car tracks have not been laid and in streets that have inadequate service or that are too far from regular lines. A great advantage of the system is that the vehicle would not be affected by traffic delays; in case of a blockade of street cars it can at once abandon the overhead wire and proceed independently around the blockade—if necessary, as in case of a fire—by a circuitous route. Rails are entirely unnecessary for its operation, and it is easily conceivable that in small towns where it might be inadvisable to go to the heavy expense of laying a system of car tracks a power house and overhead wires could be erected and a system of "trolley electric" 'busses operated, with ramifications into the side districts under storage battery current.

As yet only some such semi-public fields of usefulness as outlined for the new vehicles can be seen by those interested in the invention, as anything like a general adoption of such a system of delivery by large department stores and others, for instance, would at present prove too great a tax upon the trolley companies' power houses, not to mention the delays to transportation such a course would be certain to create, owing to overcrowded tracks. Manifestly it would be impracticable just at present to place such a vehicle on the general market, but it is understood that some system of determining and charging for the exact amount of current used could be adopted and the field widened to a limited extent.

However, in actual tests this vehicle has shown such a flexibility and ease of manipulation, with such a low cost for maintenance and repair, that it would seem that, even restricting its use to baggage and package delivery, trolley and electric light repair service, sight-seeing purposes, post-office work and such public or semi-public utilities, would open a sufficiently wide field of usefulness for it as to keep the builders busy for years to come. Construction of the vehicles in numbers is about to be begun by the Trolley Electric Vehicle Company of America, having headquarters in the Drexel Building, Philadelphia.

The vehicle shown in the illustration was built by the Lansden Company, of Newark, N. J., and the usual lines of a one-ton express wagon body were adopted merely because express, baggage and package delivery is expected to be the principal field of the wagon's usefulness. The chassis is an independent unit and the entire driving gear is mounted upon it.

The vehicle is provided with two electric motors, one a 500-volt motor to use the overhead current, and the other an 85-volt motor using current from the storage battery. The mere lowering of the trolley pole automatically cuts out the big motor and switches in the storage battery and the small motor. The battery and its motor give the wagon a radius of thirty miles of independent action, so that when it is stated that in actual service in large cities the vehicle has run 75 per cent. of the total distance traveled upon the trolley tracks, it may be seen that one charge of the battery would be sufficient for considerably more than 100 miles of travel. But any possible delay in this connection is obviated by a system of charging while in transit, which practically makes the vehicle constant in service.

Each motor is connected by a chain and sprockets through a differential gear to a countershaft which drives by two chains the rear driving wheels. Close to the operator's hand is the lever which controls the two currents—the 500-v. from overhead and the 85-v. from the storage battery. The speed-controling apparatus permits of three speeds ahead and two reverse from the storage battery, and six ahead and four reverse from the overhead wire, and a switch is arranged to effect alternately the operation of the motors. The closing of the trolley circuit opens the battery circuit, and *vice versa*, and the vehicle is driven by either current without change of speed.

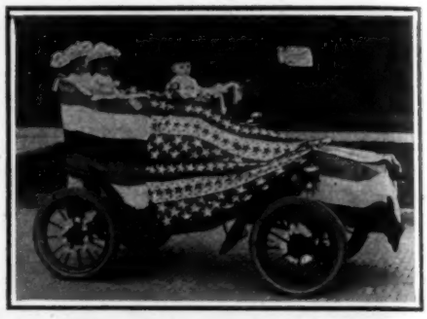
The circuit from the overhead wire is not completed through the wheels to the rails, as in street cars, since the wheels are shod with solid rubber tires, but through the medium of metal shoes or slides composed of copper chains or wires, which rest upon the tracks. When the vehicle leaves the trolley tracks and the trolley pole is lowered, these shoes are raised from the ground and are not again lowered until the car tracks are reached once more.

To insure easy turning off the tracks, the tread is so arranged as to be slightly in excess of the standard trolley width, one wheel running in the track, the other on top of the flange. If the off wheels are in the track, a turn to the right is effected with one motion; a turn to the left is accomplished by first turning to the right sufficiently far to bring the off wheels out of the track and then a slight turn of the steering wheel enables the off wheels to mount the flange.

The batteries are slung under the chassis frame, well out of the way, and sufficiently high to clear any ordinary street obstacle. A powerful foot-brake acts upon the inner side of the rear hubs. As only a small battery is required, the weight of the wagon is kept well within the limits of a steam or gasoline vehicle designed for similar work, while the ability to charge the battery from the overhead wire while in transit materially reduces the cost of maintenance and avoids delay.

NOVEL DECORATED CAR.

Much ingenuity and artistic ability have been displayed from time to time in the decoration of automobiles for parades in different cities of the country, but the car shown in the accompanying engraving was unique in the matter of operation. The inventiveness of its owner, N. A. Wolcott, of Warren, Ohio, was recognized when he was awarded



BLUE RIBBON WINNER IN WARREN PARADE

the blue ribbon for first prize in the night carnival of the Warren home week celebration last fall.

The machine was an Olds curved-dash runabout, so arranged and draped as to convey the impression that the owner's little son, aged eighteen months, was steering the machine. So effective was the disguise that many spectators actually thought the child was in full control, and many of the remarks heard by the owner during the parade were ridiculous in the extreme.

For the occasion a tonneau seat was fitted behind for the two little girls, aged four years, and the car was built out in front so that the owner could lie comfortably on the foot mat and be entirely concealed by the flags and bunting. Steering was accomplished by means of an eight-inch tiller that temporarily replaced the regular tiller. The throttle was operated by the knee.

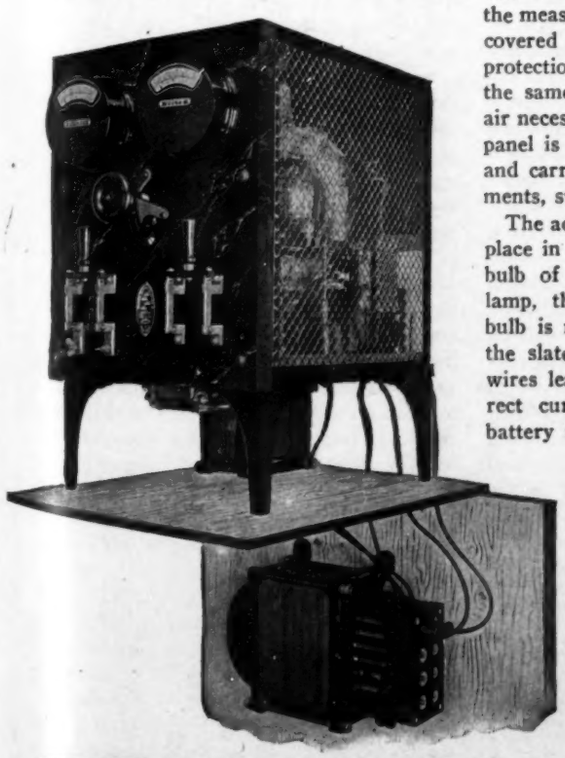
A demand for American motors, chiefly of the two-cycle type for boats, is reported by U. S. Consul Mowrer, of Ghent. He writes that the use of power boats in Belgium is constantly increasing, especially in Flanders, where the canal system is extensive. Among the motors especially in demand are the Wolverine, Truscott and Lozier. In the larger powers the motors used are usually imported from France. The Consul suggests the establishment of an agency in which a stock of motors would be kept and where practical demonstrations could be made. He names Theo. Albers, rue Basse, Ghent, as a possible agent and who solicits correspondence. This seems like a good opening for motor builders.

Apparatus for Charging Storage Batteries.

AN objection frequently brought forward against the use of the electric automobile is that there are many localities where a direct or continuous electric current, which alone can be used for charging the battery, cannot be obtained. If the owner of an electric automobile in such a locality wishes to have facilities for charging in his private garage or automobile house, he must install some form of apparatus for generating direct current or for converting alternating into direct current; otherwise he must make trips to the nearest point where direct current is available. In cities there is no difficulty, as a rule, in obtaining the proper charging current, but in the outlying districts and in many small places it is often found that only alternating current can be had from ordinary lighting circuits.

There are several methods of converting an alternating current, which consists of a series of current waves passing alternately in opposite directions with a frequency of many times a second, into a direct or continuous current, flowing all the time in one direction. A motor-generator set, consisting of an electric motor driven by alternating current, coupled to a generator producing a direct current, may be used; a rotary converter answers the same purpose. Where no supply of electricity of any kind is available, current can be generated cheaply by installing a generator driven by a small explosion motor—a plan that is frequently adopted with excellent results.

The latest converting apparatus, and the one that seems especially suited to automobile battery charging, is the mercury vapor converter, a device based on the discovery that the vapor given off by mercury when heated will provide a path for the passage of current in one direction only. A converter constructed on this discovery is a static apparatus, having practically no moving parts, and does not require the more or less skilled attention that mechanical converters must be given; it is free from the wear incident to machinery in motion and can be operated continuously without constant attention. These are points that are of great importance from the point of view of the automobilist who is not a skilled electrician, but desires to charge his own battery. The mercury vapor converter is compact and practically self-contained, and can be placed in any convenient position without any special arrangements for installation excepting, of course, the leading in of the alternating current supply wires.



COMPLETE HEWITT MERCURY VAPOR CONVERTER, ON SHELF WITH AUTO-TRANSFORMER BELOW.

A converter of the mercury vapor type, illustrated herewith, is manufactured by the Cooper Hewitt Electric Company, of 220 West Twenty-ninth street, New York. The complete apparatus as illustrated in the engraving is 26 inches high, 15 inches wide and 22 inches deep and is self-contained except for the transformer used to regulate the voltage of the direct current. The transformer may be put in any convenient place near the converter and occupies very little space. The converter is mounted on an iron frame with short legs; all the parts, with the exception of the transformer and the measuring instruments and switches, are covered by a stout wire netting, affording protection against accidental damage and at the same time permitting the free flow of air necessary to keep the parts cool. A slate panel is mounted in front of the apparatus and carries the electrical measuring instruments, switches and regulating handle.

The actual conversion of the current takes place in a glass bulb, shaped much like the bulb of an ordinary incandescent electric lamp, though much larger in size. The bulb is mounted in an iron frame back of the slate panel and the alternating supply wires lead into the top of it, while the direct current required for the automobile battery is taken from the bottom. During the process of manufacture a small quantity of liquid mercury is placed in the bulb; after being exhausted of air as completely as possible by means of a mercury air pump the bulb is sealed. Into the upper part of the bulb are sealed two platinum wires, and two more enter at the bottom; the upper wires end in plain carbon terminals inside the bulb, while the lower ones are in small pockets formed in the glass and are surrounded by mercury in the liquid form. One of the lower terminals is placed at one side and a little above the other.

GLASS BULB OF HEWITT CONVERTER, SHOWING TERMINALS AND MERCURY POCKETS

Without going deeply into the details of the electrical phenomena, which are somewhat complex, it may be said that the upper terminals in the bulb are both positives; the alternating current, led to the positive terminals from the supply mains, is provided with a path by vapor of mercury, produced as explained later, and is thus enabled to pass from the positive terminals to the single negative electrode at the bottom of the bulb, from which it is led in the form of a continuous or direct current, the peculiar properties of the mercury vapor permitting the current to flow from the positive terminals to the negative terminal only. The direct current is still pulsating, though the pulsations are all in the same direction; and it is therefore led through a coil of special form, called a reactance coil, which has the effect of lessening the pulsations and making the current more uniform. A transformer is used to regulate the voltage of the direct current for charging the battery of the automobile.

One of the peculiarities of the mercury vapor apparatus is that the negative terminal, at the bottom of the bulb, offers an exceedingly high resistance to the starting of the flow of current; but once the flow is started, the resistance is comparatively slight. It is therefore necessary to supply some means of breaking down the negative electrode resistance before the current will flow from the two positive terminals at the

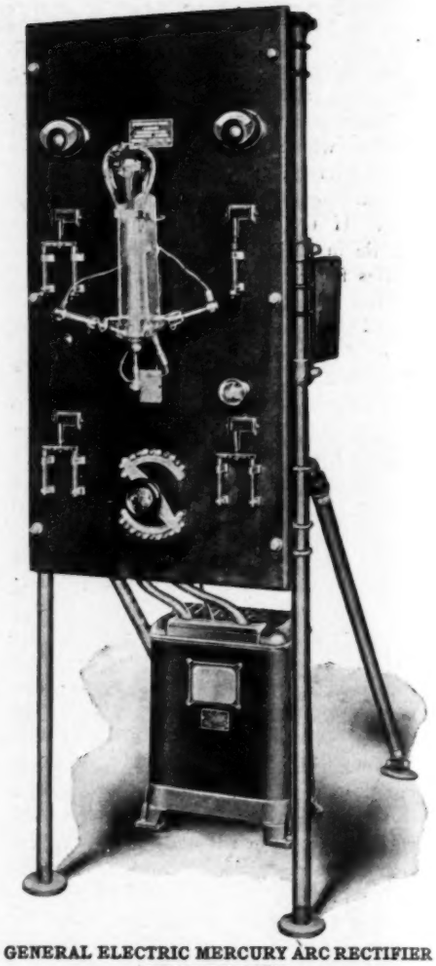
top of the bulb to the negative terminal at the bottom. The fourth terminal, near the negative terminal, is used for this purpose, being brought into action by the automatic tilting of the bulb, the tilting being accomplished as follows: The bulb is placed in an iron frame supported on knife edges; from the frame projects an arm carrying on its extremity a rod attached to the core of a solenoid. When the connections are made and the current switched on, direct current from the battery, passing through the solenoid, causes the core to be drawn downward and the bulb to be tipped until the two small bodies of mercury flow together for an instant and then separate, causing an arc or "flash," which heats and vaporizes a small portion of the mercury and breaks down the negative electrode resistance. As soon as the alternating current commences to flow through the conducting vapor the solenoid is automatically cut out of the circuit and the bulb drops back. If the converter does not at once start working the tipping is automatically repeated until it does; if, however, action starts at once the tipping is not repeated until another interruption to the flow of current from the positive terminals to the negative terminal takes place. Thus, if the converter is used for charging an automobile battery, it may be started in the evening and left to itself; if for any reason, such as the temporary cessation of the supply of alternating current, the converter stops work, the automatic starter will come into play as soon as the current supply is resumed and charging will recommence. When the battery is fully charged, so that the resistance to the flow of direct current is equal to the pressure, so to speak, of the direct current supply, the converter will cut itself out automatically, opening all the circuits, so that there will be no wasteful flow of current from the feed wires and the battery cannot discharge itself back through the converter.

MERCURY ARC RECTIFIER TUBE OF GENERAL ELECTRIC SET.

The heat generated by the passage of the current through the vapor while the converter is at work is considerable, and, in order to prevent the vaporization of too much of the liquid mercury in the bottom of the bulb, the bulb is made of considerable size, so that the cooling surface exposed to the air will be sufficient to condense the excess of vapor, which returns by gravity to pockets surrounding the lower terminals.

The type P. A. Hewitt converter is made especially for charging automobile batteries from a single-phase alternating current supply, and the standard design provides for 30 amperes direct current with a direct current voltage of from 80 to 115. Special outfits can be supplied giving lower or higher voltages, the highest not exceeding 240 volts. The regular outfit can be used with either 110 volts or 220 volts alternating current supply. A good method of installing the converter is to set it on a shelf at a convenient height, with the transformer under the shelf.

The converter manufactured by the General Electric Company, of Schenectady, N. Y., and 44 Broad street, New York city, is called a mercury arc rectifier; though involving the same fundamental principles as the Hewitt apparatus, it differs considerably in detail and general form, as will be seen by the accompanying engravings. The glass bulb is comparatively high and of small diameter; the lower part is enlarged and contains the positive electrodes, one on the right and one on the left of the enlarged part, while the negative electrode and the starting electrode occupy the same relative positions as in the Hewitt instrument. The upward extension of the bulb is used as a condensing chamber for the mercury vaporized by the heat generated in the passage of the current. The bulb is mounted in spring clips in the center of a black slate panel supported on an iron pipe framework; around the bulb are grouped the electrical measuring instruments and the necessary switches, the regulating handle and the pilot lamp. A compensating reactance, by means of which the current supply is regulated and controlled, is connected across the alternating current supply mains; it may be mounted on the back of the panel or placed on the floor under the panel. The controlling handle is on the panel, near the bottom. The apparatus being self-contained, it can be installed anywhere without special preparation. The slate panel is 48 inches high, 24 inches wide and 1 1-2 inches thick; the total height, including the 1-inch pipe supports, is 76 inches. A starting resistance, mounted on one of the pipe supports, permits the rectifier to start before the load is thrown in; as long as the starting resistance is in the direct current circuit a pilot lamp,



GENERAL ELECTRIC MERCURY ARC RECTIFIER CHARGING SET.

mounted on the panel, is lighted, but when the battery is placed in the circuit the light is extinguished.

In starting the rectifier the flash necessary to break down the initial resistance of the negative electrode is produced by slightly shaking the bulb by hand. On special order an automatic shaking device can be supplied, though it is not included in the regular outfit.

The standard General Electric outfits are suitable for operation with either 110 volt or 220 volt alternating current, 60-cycle, single-phase circuits. For batteries requiring a range of direct current of from 45 to 115 volts, the 220-volt circuit gives the most economical service; while smaller batteries, requiring from 16 to 45 volts direct current may be most economically charged by the use of 110 volts alternating current. Three standard sizes are furnished, ten, twenty and thirty amperes, and the instrument can be adapted to any direct current required for battery charging.

Manufacturers of mercury vapor converters state that the efficiency obtained under ordinarily favorable conditions is about 80 per cent.; a little more under the best conditions and less if the conditions are unfavorable; the instruments are made to give the best results under the average conditions imposed by battery charging.

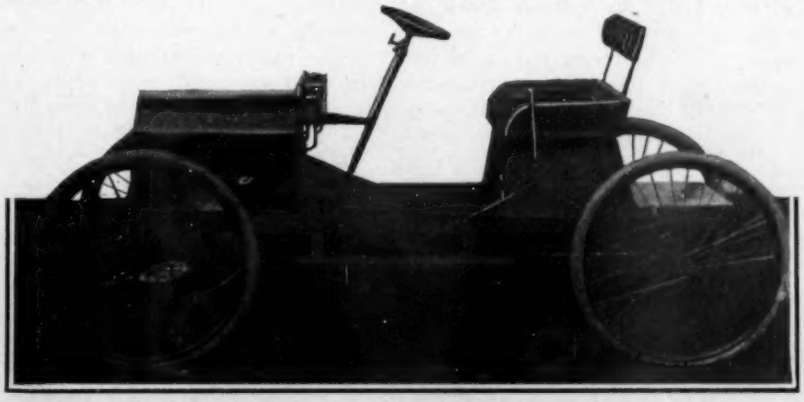
Owing to their simplicity of operation, lack of moving parts and comparatively low first cost, the mercury vapor apparatus is well adapted for use in private garages. Expert manipulation is not required, and, with automatic starting apparatus fitted, the converter can be left charging the battery over night without danger of overcharging or of allowing the battery to discharge itself. The only part liable to breakage is the glass bulb, and this is guaranteed by the manufacturers for a time sufficient to allow any inherent defects to manifest themselves. In case of accidental breakage, however, the bulb can be replaced at moderate expense.

BOYS' HOME MADE CAR.

When the little car shown in the photograph reproduced herewith was given its first test after completion and found to work perfectly, it proved the happiest moment in the life of Nels J. Nelson, an eighteen-year-old boy of New Britain, Conn., for the car embodied in concrete form the ideas and workmanship of the young machinist and his partner, Ernest Powell, of the same place.

The little car measures 5 feet 6 inches between axles and has a tread of 30 inches. Within these dimensions the boy inventor has contrived to provide the features of a practical touring car, at a cost for materials of only $22.30. Nelson has been experimenting for three years in the construction of gasoline engines, the one in this car being the third that he and his partner have built. The first one was a motorcycle engine which was fitted to a bicycle that afforded the boys much pleasure. The second was a stationary gasoline engine. The third and present one is a 2 1-2-horsepower air-cooled engine for which Nelson made the patterns; he had to have the parts cast for him, and the cylinder was purchased, but the other parts of the car, including the bicycle wheels and the body, were made by the boys in their little 8 by 16-foot shop. Work on the engine for the machine was started about four months ago, and the entire car was completed in three months.

The car has shaft drive with universal joints, a two-speed transmission giving three to four miles on low and from ten to twelve miles an hour on high, and will carry two persons on the seat.



DIMINUTIVE 2 1-2-HORSEPOWER AUTO, BUILT BY TWO NEW BRITAIN YOUTHS.

Artistic Ensemble of Garden Show.

VISITORS to the automobile show in Madison Square Garden next month, who have attended previous shows in the same building, will have to rub their eyes a few times to convince themselves that they are awake and in the same old hall. It will be the same permanent structure, to be sure, but, with a big B, the interior will recall no memory of the heterogeneous and multitudinous jumble of inartistic effects in color and form that has been the chief characteristic of the Garden shows.

There will be decorations in the 1906 show, and not of the sort the term usually implies—individual and inharmonious efforts to get striking effects at the different booths. Instead, there will be a harmonious, coherent design, which will embrace every square foot of floor, wall and roof area, in which the architect, the sculptor, the weaver of textiles and the scene-painter have supplemented each other's art in an effective composition. With the aid of the electrician and the sign-maker, the visitor will be able to see and understand what he sees, without violence to a discriminating taste.

From the Madison avenue entrance the visitor will get a first and favorable impression in passing through a pergola before entering the building proper. In this approach green will be the predominant color, and softened lights will give contrast to the brilliancy of the hall beyond. At the curtained entrance to the hall, on the main floor, where the visitor enters, a fountain will mark the parting of the aisles, of which there will be two, one on each side. A draped figure of a woman, holding aloft an automobile, typifying speed, on which a brilliant white light will be projected, is the centre-piece, surrounded by Corinthian columns, supporting an arch. Colored lights will fall on the water below, which will stream from the mouths of monster batrachia. To the right the modeled figure of the automobile girl, and to the left that of the chauffeur, will point the way toward the interior of the hall.

When he has recovered from his surprise at this display of art in a Garden show, the visitor naturally will look about in wonder. He won't be disappointed. In outline he will recall the various world's fairs of recent years, with their mass of peristyles and colonnades and detail of pilasters and columns and capitals. And in

FOUNTAIN FACING GARDEN ENTRANCE.

color the white of the staff work, relieved with gold, will be subtly blended with green and blue, all used with a view to setting off the rich colored bodies and glistening metal work of the cars on exhibition.

Down the center of the hall a colonnade will extend from the central arch at the entrance for a distance of 196 feet. This, as well as all the other plastic decorations, will be made of the familiar white "staff" or plaster composition. The floor, except in the aisles, will be covered by an old-gold colored carpet, and on each side of the colonnade the central rows of exhibits will be placed. Above each stand, at the cornice, the name of the exhibitor will be seen in gold letters on a white background illuminated by incandescent lamps which will be hidden from direct view, just as are the lights in a picture gallery. These lamps will extend the entire length of the colonnade on both sides, and will aid the lighting up of the exhibits on the floor. All the signs will be uniform in style.

On the gallery side of the aisles the effect will be carried out by pilasters which will cover the lower members of the roof arches, and will give the effect of columns supporting the gallery. This effect will be carried higher up by pilasters and cornice encircling the first gallery, and similar treatment of the walls to the upper gallery. White silkoline, green burlap and green smilax decorations will hide the gallery walls and pleated silkoline with festoons of smilax will adorn the gallery fronts up to the top of the rail. The immense roof will be hung with a canopy of turquoise blue picked out with gold stars, to give the effect of an Italian sky, and the entire end of the Garden opposite the entrance will represent an Italian scene. Three great clusters of lights in the roof will fill the interior with a rich, diffused light.

Although much work has yet to be done in the preparations of the actual decorations, splendid progress has already been made, and in various shops in New York and outside the scheme is taking shape. Under the guidance of George A. Witherspoon, the architect of the scheme, a party of newspaper men and others inspected the staff work last week. The accompanying engraving gives only a suggestion of the scheme of decoration, as it was made from a sketch and not from the actual structure. It is the intention to erect a section of the staff work soon and photograph it, so that exhibitors can get a good idea of what the setting of their exhibits will be like.

Decorations for the Coliseum.

Ninety-five complete car makers have been allotted space for displays at the Chicago Automobile show of February 13 to 10 next. This number, it is believed, will equal, if it does not exceed, the combined complete car builders' showing at the two New York exhibitions. Final allotments of spaces for sundries displays are being made this week and the allotments will be announced in a few days. Complete cars will for the first time be exhibited on the second floor of the Coliseum annex, heretofore devoted to sundries. In addition to the use of all available display space in the Coliseum, the main floor and all the gallery of the First Regiment Armory will be utilized.

The scheme of decoration in the Coliseum is more comprehensive and artistically planned than ever before. The walls all around the building will be finished in Dutch paneling with a cap of staff figured with wreaths of flowers, in the centers of which will be clusters of electric lights. The woodwork is to be stained in a dark color like mission furniture and the staff will be tinted to match. Extending lengthwise of the great arched hall there are to be three rows of tall columns supporting the signs of the different exhibitors that have spaces on either side. The pillars will be of wood covered with staff having designs in relief, and will be surmounted each by a cluster of five frosted globes enclosing incandescent lights. Four of these globes will be one foot in diameter each, and the uppermost globe will measure sixteen inches through the center. The panels extending from column to column overhead will also be covered with staff in relief, and from them will depend by iron chains series of metal shields, each bearing one letter of the name of a car or of a company to be found beneath. As a rich background for the shields there is to be a heavy drapery of straw color hanging down three feet below the panels and looped up at regular intervals.

To separate the booths there are to be low rails between them, but the fronts on the aisles will be unobstructed.

All the glaring arc lights above and below the gallery are to be removed and their place taken by handsome hanging clusters of frosted incandescent light globes diffusing a mellow illumination that will greatly change the character of the lighting of the building.

To date the decorators have not advised Manager S. A. Miles of their plans for overhead treatment of the arched roof.

Show Week Meetings.

Again this year as in the past, show week, both in New York in January and in Chicago in February, will be the occasion for the holding of a number of annual business meetings and banquets of national interest.

Doubtless the affair of greatest public interest will be the annual banquet of the Automobile Club of America, promoter of the Sixty-ninth Regiment Armory show. As usual, this will be held on the concluding night of the New York show week, January 20, in the great ballroom of the Waldorf-Astoria Hotel, beginning at 11 P. M. Although the committee in charge is not yet ready to give out details of plans for the night's entertainment, it is hinted that there will be a number of special new features that will prove attractive. Covers are to be laid for upwards of five hundred members and guests.

As yet the promoter of the Madison Square Garden show—the Association of Licensed Automobile Manufacturers—has not formulated plans for any social function for the week, but it may reasonably be expected that later it will decide to give a dinner, or at least a smoker and entertainment of some sort to the exhibitors, thus filling the vacancy left by the retirement of the National Association of Automobile Manufacturers, which, as one of the joint promoters of recent Madison Square Garden exhibitions, usually gave a banquet or smoker during the momentous week. As host this year, it seems to be "up to" the A. L. A. M. to provide something of the sort, although the fact that the manufacturers who compose its membership will be extraordinarily busy at the time may be considered sufficient reason for abandoning any such function this winter.

The annual business meeting of the N. A. A. M. is scheduled for Wednesday, January 17, at 11 A. M., at the Victoria Hotel. At this meeting the annual reports of the president, secretary and treasurer are to be read and members of the executive committee elected for the ensuing year. Nominations close with the first mail on January 2. Following the election, the new executive committee will hold a meeting on the same day, at which officers for the succeeding year will be considered. Although these officers can be elected at any time within thirty days after the annual meeting, it is probable that, as last winter, the election will be held at the February meeting of the committee, which will occur in Chicago, on Wednesday of the Coliseum show week. It is thought probable that most, if not all, of the present officers will be renominated for election.

The annual convention of the American Automobile Association has been set for the week of the shows in New York, January 13 to 20, and will be held in the Sixty-ninth Regiment Armory, which will shelter the A. C. A. exhibition. Reduced railroad rates for this meeting have been secured for members, as heretofore. The regular election of officers will take place at this meeting. A subsequent meeting is fixed for Chicago show week, for which arrangements have also been made for reduced railroad fares.

There will doubtless also be arranged meetings of the American Motor League for both show weeks, and several trade and club dinners, such as the Hyatt Roller Bearing Company and New York Motor Club affairs of last winter.

Air-Ships at Club Show.

Quiet but earnest efforts are being made to provide for the forthcoming automobile show in the Sixty-ninth Regiment Armory, New York, the most advanced and spectacular feature contemplated by the management of any of the winter's shows. It develops in a roundabout way from Paris, that the Automobile Club of America is trying to secure, through its latest offshoot—the Aero Club of America—a display of the latest models of balloons and air-ships from France.

An invitation was sent recently by a prominent member of the Aero Club of America to Compte de La Vaulx, a well-known French aeronautist, to visit New York in January and give a series of lectures on aerostation. He was also asked to use his influence with the French balloon makers to send their products to New York for exhibition at the A. C. A. automobile show. Concerning this invitation, the Compte de La Vaulx said, according to a Paris dispatch to the *Herald*, that he would certainly fall in with the wishes of the American club, among the members of which he counts many personal friends.

Secretary Butler, of the Automobile Club of America, assures THE AUTOMOBILE that a display of the latest balloons is seriously intended as a feature of the club's show, although it had been the intention to say nothing about it until the possibilities of securing exhibits were fully determined.

The artistic and spacious armory building, which is conveniently located at Lexington avenue and Twenty-fifth street, is to be thrown open to the public for the first time on the occasion of the show. This is a magnificent structure just nearing completion, whose cost is placed at $1,500,000. In the great exhibition hall is a brick arch that is probably the largest in the world of this material. Of course everything about the building will be new and clean, and in the matter of decorations for the show an effort will be made to have them harmonize with the displays and accentuate the architectural beauties of the building. The decorations are not to be elaborate, but will be mad

subordinate to the exhibits that constitute the show.

CLEVELAND SHOW PLANS.

Local Dealers Unite on Central Armory and Vote $10,000 for Decorations.

CLEVELAND, Dec. 11.—The Cleveland Automobile Dealers' Association believes that its show this year will be the greatest local function of the kind ever held. All differences with T. C. Whitcomb, the "independent" dealer who claimed to have an option on the Central Armory for the show week, and who threatened to hold an independent show on his own account, have been patched up, and several of the dealers outside the ranks of the association who were waiting to see what Whitcomb might do, have now joined hands with the association, so that there will be but one big show.

Central Armory will afford almost twice the floor space that the old Grays Armory did for previous shows, but the indications are that even this increase will not be sufficient to take care of the demand. The main floor will be given over entirely to automobile exhibits, and the exhibitors will not be permitted to have elevated signs of great size as in the past. Instead, small brass signs of uniform design will be used.

In the matter of decorations, the show will far outclass previous attempts. The association held a meeting a few nights ago and voted to appropriate $10,000 for beautifying the hall. The main floor will be lighted by 1,200 colored incandescent lamps, as well as thirty-two arc lights of 50-candle-power each. Under the gallery, 560 incandescent lights will be placed, and above the gallery, where sundries and specialties will be exhibited, will be about 500 more.

MORE BOSTON SHOW SPACE.

BOSTON, Dec. 11.—So great has been the early demand for space at the show of the Boston Automobile Dealers' Association that is to be held in Mechanics' Building in March that the show committee and the manager have hit upon a scheme of making use of the broad balcony that surrounds three sides of grand hall, the main apartment of the building. This balcony is very broad and is filled with many rows of seats. Last year it was given up to spectators. It has been found that it is possible to remove most of the seats, thus giving many additional feet of excellent show space. Several leading manufacturers of cars will be found in this balcony.

The committee is now at work upon the decorative scheme for the building and it is promised that the decorations will be on a grander scale than ever before. All the exhibition space will be carpeted in green. The color scheme of the signs and other decorations will shortly be decided upon. As many prominent exhibitors have been forced to take space in exhibition hall, this will be treated uniformly with grand hall.

The committee recently met representatives of the power boat builders and discussed plans for the boat displays in the basement. The boat builders suggested a number of improvements in relation to their part of the exhibition and these will be put in operation by the committee.

LOCAL SHOW SANCTIONS.

In addition to the national show to be held in Chicago from February 3 to 10, following the two big New York shows of January 13 to 20, sanctions for local exhibitions have been granted by the National Association of Automobile Manufacturers as follows:

Washington Automobile Dealers Association, Inc., Feb. 3-10; Tri-State Sportsmen's Association, Detroit, Feb. 12-17; Cleveland Dealers' Automobile Co., Feb. 19-24; Buffalo Automobile Trade Association, March 5-10; Boston Automobile Dealers Association, March 10-17; Denver Automobile Show Association, a date in April to be hereafter decided upon.

The New York *Herald* states that shortly before his death, Clarence Gray Dinsmore placed 10,000f. at the disposal of the Herkimer Committee as a prize.

PHILADELPHIA SHOW.

Expert Exposition Display to Be Managed by C. I. Campbell—Date Advanced.

PHILADELPHIA, Dec. 11.—The regular ticket of officers nominated for the Philadelphia Automobile Trade Association was elected last Tusday night at the Hotel Hanover, as follows: President, A. E. Maltby, of the local Winton branch; vice-president, Gilbert S. Smith, of the Motor Shop; secretary-treasurer, I. J. Morse, of the Locomobile branch. These three officers and W. F. Smith, of the Rambler branch, and Daniel Cohen of the Reo, constitute the board of directors.

A change of date for the annual show was decided upon, that function now being scheduled for February 24 to March 3. After much discussion, Chester I. Campbell, who has successfully managed several similar affairs in Boston, was selected to look after the details of the coming exhibition under the general direction of the show committee appointed by President Maltby at the last meeting.

At the Hotel Walton, on Friday night, the show committee met Manager Campbell and outlined the preliminary work. Various subcommittees were named and instructed to take up at once the several branches of work assigned them. It was also decided to open an office immediately near City Hall, where all the business directly connected with the show will be transacted.

The south pavilion of the National Export Exposition, in which the show will be held, is about 100 by 400 feet in dimensions, and a floor plan showing the arrangement of the spaces is being prepared and will be ready for distribution this week. The huge structure is so arranged that if additional space is required it can easily be provided for by throwing open as much of the main structure as desired—all on the ground floor. On the second floor are large meeting rooms especially designed for restaurant, office and cloak-rooms. Indeed, a better-equipped building for the purpose would be hard to find anywhere.

EXPORT EXPOSITION BUILDING, IN PHILADELPHIA, WHERE AUTOMOBILE SHOW IS TO BE HELD MARCH 3 TO 10 NEXT.

Low and High Tension in Magneto Ignition.

(From the Autocar. Concluded from page 570, issue of November 23.)

EXCESSIVE SPARKING AT CONTACT POINTS.

LET us now consider the result of switching off at *S* (Fig. 17).* So long as *S* is open, the circuit through the induction coil is permanently broken, but so long as the engine continues to drive the magneto a current is intermittently generated in the armature coil.

This current reaches a high value, since the armature coil is short-circuited until the platinum points separate. The current is then suddenly prevented from flowing. A violent self-induced current is generated, and serious sparking takes place between

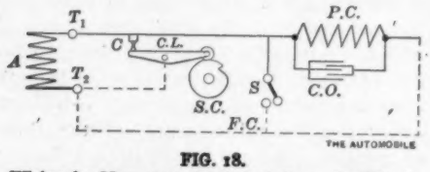


FIG. 18.
Wiring for Magneto, with Switch Correctly Wired.

the platinum points. These become badly pitted in a very short time. We must, therefore, find some other method of wiring the switch. This is given in Fig. 18.

It will be seen that the switch is now connected on one side to the wire leading from the magneto to the coil, and on the other to the frame, or, in other words, is grounded.

When the switch is in the position shown, we have two parallel circuits—across the platinum contacts and through the induction coil—in operation without interference.

If we close the switch *S*, what will be the effect? Whatever the position of the platinum points, the switch now offers a perpetual path to the current without involving the resistance of the primary winding of the induction coil. In other words, no appreciable current ever passes through the coil, no secondary current is generated, and there is no spark at the plug.

Even though the engine continues to drive the magneto, no harm is done, for the current flows round through the switch, and so long as this easy path is offered to it there will be no tendency to spark across the platinums.

The action of the switch is the reverse of that to which we are accustomed. When the switch is open, ignition proceeds as usual, but when it is closed no spark is produced.

At the present moment there are a large number of cars, and a very large percentage of motorcycles, running with their switches wired wrongly. We shall go back to this subject when we deal with the wiring of a magneto for multi-cylinder engines. Incorrect wiring of the switch on cars is little short of fatal.

* See issue of November 23.

We have now shown how the wiring of a storage battery system of ignition is altered to meet the use of a magneto, and the result reached in Fig. 18 is identical with the method employed in the Eisemann system. The induction coil in this and some other systems is separate from the magneto machine, but there are now on the market several high-tension magnetos in which the induction coil is included in the machine itself.

INDUCTION COIL AND INDUCED CURRENTS.

In order to understand this method properly, it will be well to consider, shortly, what constitutes an induction coil, and how the induced currents are generated. When an electric current flows along a wire that wire is surrounded by a "whirl" of circular lines of force, having the wire at their common centre. So long as the current flows steadily the whirl remains still, but when the current rises or falls the whirl expands or contracts in unison with it.

If we suddenly break the circuit, the whirl falls in almost instantaneously upon the wire, and when the current is again caused to flow the lines spring out like the ripple around a stone thrown into still water.

Anyone who takes the trouble to watch these ripples will notice that when they encounter any obstacle—such as a stick protruding from the surface of the water—a subsidiary system of ripples springs into being around that obstacle.

It is so with the electrical current. If another conductor is placed within the range of the whirl as it springs out from or falls back on its centre, a secondary whirl is caused around the conductor. The secondary whirl exists only so long as the conductor is being cut by the lines of the primary whirl.

This whirl of force and the electric current are inseparable; where one exists, the other exists also. Hence it follows that, as the primary whirl cuts the secondary conductor, a brief current is generated in that conductor. If the secondary conductor consists of one wire only, the voltage of the secondary current is exceedingly small. It can, however, be increased to an almost unlimited extent by increasing the number of turns of the secondary conductor.

Obviously, if we desire the lines of force to cut the secondary conductor in many thousand places at the same time, it is most convenient to arrange both primary and secondary conductor in the form of coils. By so doing, and by filling the centre of the coil with a soft-iron core, nearly all the lines springing out from every turn of the primary coil may be caused to cut nearly every turn of the secondary coil. In this way a secondary current of very high voltage may be generated, and we obtain a jump spark between the points of the plug.

We are quite used to the general appearance of an induction coil, or rather to the appearance of the oblong or cylindrical case which contains it. Hence the high-tension magneto, giving its high tension current direct from the armature windings, appears at first sight to be something quite different.

HIGH-TENSION MAGNETO AND INDUCTION COIL PRINCIPLES IDENTICAL.

The broad principle is, however, identical. Instead of one simple winding, the armature core is surrounded by two separate coils. One, the primary coil, is of comparatively thick wire, and consists of a very limited number of convolutions. The other, the secondary coil, is formed of a large number of turns of very thin wire. The wires of both coils are carefully insulated, and the two coils are also insulated from one another. We have here all the constituents of the ordinary induction coil. It is only necessary to provide a current in the primary coil which shall be suddenly broken at suitable intervals, and we shall obtain a secondary current capable of giving a spark at an ordinary sparking plug. But the primary current, as we have seen when discussing the low-tension magneto, is provided by the rotation of the armature between the poles of the field magnets. Further, this current is broken, when at or near its full strength, by the contact breaker contained in the magneto machine itself.

Clearly, it follows that a secondary current will be obtained at each "break," dependent for its strength on the speed of rotation of the armature and on the suddenness of the break. There will, undoubtedly, be other subsidiary effects produced. For instance, the rotation of the secondary

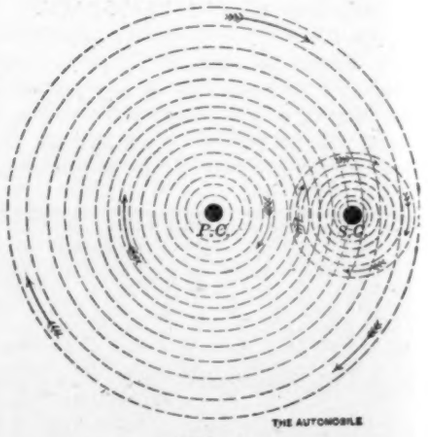


FIG. 19.
Showing Lines of Force Closing in on Primary Conductor, P C, at the Moment of "Break," and the Consequent "Whirl" Round the Secondary Conductor, S C.

coil will itself create a difference of potential between the ends of the secondary winding. But though this, and other details which need not be discussed here, certainly must to some degree affect the nature

of the spark, yet they are, as we have said, only subsidiary, and in trying to understand the action of the high-tension magneto we shall do well to neglect them altogether. We should remember that the predominating influence is that with which we are already so familiar in the ordinary induction coil.

Self-Induction.

We are now in a position to consider more fully the phenomenon known as self-induction, to which we have already referred more than once.

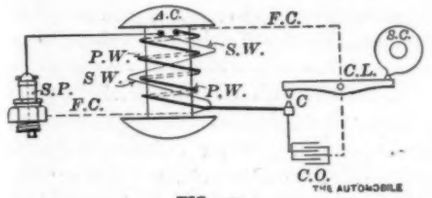


FIG. 20.
Connections of High-tension Magneto, Bassee-Michel Type.

P W, primary armature winding.
S W, secondary armature winding.
A C, armature coil.
C L, contact lever.
S C, steel cam.
S P, sparking plug.
C, platinum contacts.
C O, condenser.
F C, frame connections.

Let us take the case of a sudden break in the circuit. The lines of force surrounding every portion of the coil suddenly close in. In so doing the lines falling in on one convolution of the coil cut the neighboring convolutions. This is the only condition necessary for the production of an induced current—the cutting of a conductor by lines of force. Thus at the moment of break the coil induces a current in itself. If the break is sudden the voltage of the self-induced current may be considerable. This fact, as already mentioned, is utilized in the design of low-tension plugs of the electro-magnetic type.

It is not essential that the circuit shall be actually broken. Any sudden increase or decrease of the current flowing through a coil must always result in the generation of a self-induced current.

This current always flows in such a direction as to hinder the change which causes it. For instance, if the current in the coil be suddenly decreased the self-induced current will tend to prevent its instantaneous decrease by flowing in the same direction as the original current.

Similarly, if a current suddenly ceases to flow in a coil the self-induced current tends to maintain the flow, and when the circuit is "made" self-induction prevents the current from rising instantaneously to its full value.

An example of a system of wiring for a magneto, which combines the induction coil with the armature winding, is given in Fig. 20. There are other systems in use besides the one shown. Referring to the figure, it will be seen that the primary winding is connected to one of the contacts *C*, thence the current travels across the contacts to the lever *CL*, and returns to the other end of the primary winding by way of the armature spindle. The contacts are closed for the greater part of a revolution, and it is only when the points separate that a strong current is induced in the secondary winding and a spark passes. By connecting the switch across the primary circuit, so as to provide a path other than that across the contact points, ignition would be arrested.

For the sake of simplicity, we have hitherto considered only simple circuits for single-cylinder engines. Very little complication is required in order to adapt the high-tension magneto to work multi-cylinder engines.

Distributing the Current.

The secondary current, instead of passing direct to the plug, is led to a high-tension distributer. Distributers of this type were very little used a few years ago, as it was supposed that satisfactory insulation would present great difficulties. At the present day, however, their use is not limited to magneto ignition. The single coil and secondary distributer offers a ready means of synchronous timing, which can hardly be obtained in the same perfection when several tremblers are in the system, and the adjustment of these influences the synchronism.

A diagram of the high-tension wiring only, for a four-cylinder engine, is given in Fig. 21. This will be the same, whatever high-tension magneto may be employed. The distributer is almost invariably built up with the magneto machine, being gear driven from the armature spindle. Fig. 21 does not show a practical form of the apparatus, but is only a diagram. The secondary winding is connected with the shaft

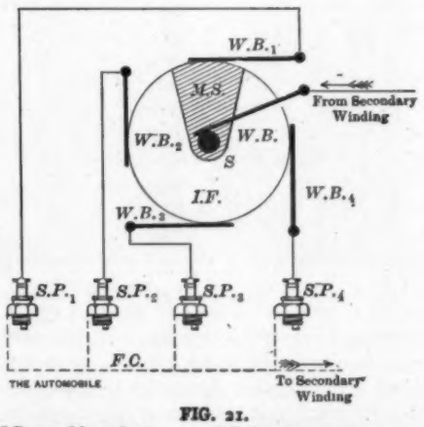


FIG. 21.

S P, sparking plugs.
F C, frame connection.
M S, metal segment.
I F, insulating fibre.
S, metal spindle.
W B, wipe blades.

S, from which the current passes through the metal segment *MS*, and is led to the four sparking plugs in turn. Usually the connections to the plugs are made in the order of 1, 2, 4, 3, counting the front cylinder as No. 1.

In practice, the blades *WB* may be replaced by balls, held down by springs, or by devices in the nature of sparking plugs, which do not quite touch the metal segment, or by brushes of more suitable shape than those shown. With magnetos some form of brush is usually retained.

Dual Systems of Ignition.

Many large cars are fitted with two ignition systems. In this case it is usual to provide separate sets of sparking plugs for the two systems; otherwise difficulties will arise, owing to the connections being such as to allow the secondary current to complete its circuit without producing a spark at the plugs.

We have already referred to the wiring of the switch, and from what has been said it should be clear that, when the accumulator system is in use, the magneto must not be allowed to run on open circuit. Let us suppose the alternative battery system to be in use and the magneto to be running

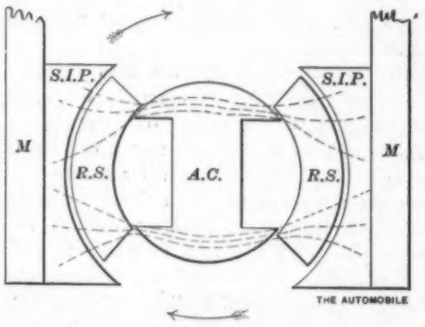


FIG. 22.

S I P, soft iron pole pieces. A C, armature core.
R S, rotating shields. M, magnets.
The dotted lines show the general direction of the lines of force.

"idle." If the switch is correctly wired, and is placed in such a position as to offer a perpetual path to the primary current, no secondary current will be generated. If we were to examine the switch, we should find it to be in the position commonly known as "on." This is correct.

Now, suppose the switch to be wrongly wired, as in Fig. 17. The magneto is running alternately on open circuit and on short circuit. At every "break" the self-induced current causes fierce sparking between the platinum points, which are soon completely eaten away.

Another mistake which may cause serious results is the following: The magneto not being in use, the secondary wires are removed from the sparking plugs. The switch is subsequently placed in the working position, and—possibly accidentally—is allowed to remain so. Strong high-tension currents are generated in the secondary windings of the magneto or induction coil. The secondary wires having been removed, these currents find no natural outlet, and in all probability break through the secondary insulation, and the apparatus is ruined.

Safety Spark Gaps.

A safety spark gap is provided in case of anything of this kind occurring, but too much faith must not be placed in its efficacy. The gap must, of necessity, be com-

paratively wide or it will interfere with the ordinary working of the ignition. Hence, though the gap may provide a path for the spark, an unnecessary strain is put on the windings. Only an understanding of prin-

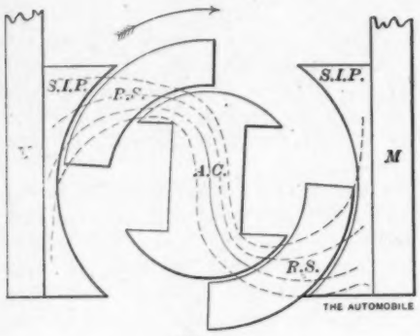


FIG. 23.

ciples can, with certainty, prevent mistakes of this kind.

ROTATING SLEEVE SYSTEM MAGNETOS.

Before concluding this article we must deal shortly with a system of current generation of such importance that it can hardly be neglected here. We refer to the system involving the use of a fixed armature separated from fixed field magnets by rotating shields of soft iron (Figs. 22 to 24). The armature stands vertically between the soft-iron pole pieces *S I P*, leaving just sufficient room for the rotation of the shields *R S*, which are diametrically opposite to one another and are joined by a non-magnetic material.

Referring first to Fig. 22, it will be seen that the shields, when in this position, act simply as extensions of the pole pieces. The lines of force pass across the top and bottom of the armature core without threading the coil. The conditions are similar to those which obtain when a rotating armature passes through the vertical position. We have already found (see Figs. 7 and 10) that this represents a position of maximum current. Passing on to Fig. 23 we see that the rotating shields have moved through an angle of 45 degrees, and it is clear that the

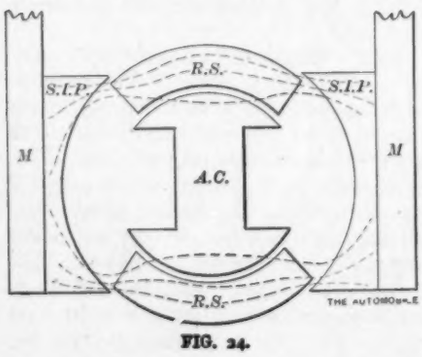


FIG. 24.

lines of force will be guided by the iron into the position shown.

Comparing this with Figs. 6 and 10 (issue of November 9) we see that a zero position has been reached. This may be seen, too, without reference to these figures, since it is clear that a small movement of the shields would not cause the lines of force to change their path. In other words, the lines of force are not in the act of cutting the coil, and no current is being generated.

As the shields approach the position shown in Fig. 24 the lines begin to cut to the coil rapidly, and by the time that the shields are situated directly above and below the armature there are again no lines threading the coil.

The distribution of the lines of force is now the same as in Fig. 22, indicating another "maximum" position. The shields now act as extensions of the armature core, whereas in Fig. 22 they acted as extensions of the field magnets. Although no lines are threading the coil the field of force is now undergoing a rapid change, and a maximum current is being generated. We see, then, that the system involving the use of rotating shields gives a maximum four times in one revolution instead of only twice. The same number of maximum positions can thus be obtained with half the speed of rotation necessary with the ordinary type of magneto.

There are many other points of interest in this system, but we should not be justified in entering more fully into them in an article which only professes to deal with the subject generally, and not with any specific type of magneto.

NEW PUBLICATIONS.

Novels in which the automobile is the pivot of the plot are increasing in popularity, following in the wake of the automobile itself, for the "new locomotion" provides the novelist with unbounded opportunities for evolving new situations and improving on old ones. Full advantage is taken of these opportunities in the story of "My Friend, the Chauffeur," a novel by C. N. and A. M. Williamson. From the point of view of a technician the book is not, perhaps, exactly "according to Hoyle"—in fact, the authors take some decidedly novel views of matters mechanical. The book was not written, however, as a mechanical treatise, but as an amusing story, and an amusing story it is. An Englishman who is a real lord and is in need of ready money, temporarily suppresses his title and turns his automobile to good account by taking a rejuvenated American woman, her beautiful niece and her precocious daughter touring through Italy, for a consideration. The needy lord, who, by the way, is a magnificent fellow, takes along his intimate friend, who also has a "handle" to his name which is not suppressed. The party proves to be a most congenial one, but, unfortunately, there is a certain dark, handsome prince who insists on following the tourists in his own car in order to enjoy the society of the ladies, whose acquaintance he has already made. The prince also has an automobile which, though faster than the less pretentious machine used by the tourists, is continually giving trouble, and much amusements is caused by the efforts of the prince to disguise the fact. Of course everybody falls in love with somebody, and the climax is reached when the prince, who develops into a first-class villain, carries off the lady of his choice by main force, using a steam yacht and his automobile as accessories to the deed. The Englishman with the title follows and batters down a door at the psychological moment and rescues the fair maiden from the clutches of the dark villain. The book, which consists of 324 pages and is attractively illustrated, is published by McClure, Phillips & Co., New York.

SUBSTITUTE FOR THE PIT.

Instead of the somewhat expensive and inconvenient repair pit common to most automobile establishments, a Paris grocery house has adopted the simple expedient of a wood and iron platform having an inclined runway at one end. A car can be run up under its own power, and when mounted, is secured by a chain attached to the wall to prevent danger of a false start. Should the motor be disabled, the automobile is easily drawn on to the platform by means of a rope and windlass.

The firm of Felix Poton, which has adopted this system, possesses nine trucks and delivery vehicles, the majority of them being De Dion-Boutons, the mechanical parts of which are not easily accessible from above, and it has found the platform a most convenient and time-saving contrivance, as the workmen are not put to the inconvenience of climbing into and out of a pit. There is also a better light on the machinery, as the platform stands at a comfortable working height from the floor.

NEW USE FOR AUTO TRUCK.

The Knox auto truck, which S. A. Miner has been running as a coal wagon for the fire department for about a month, was withdrawn from duty for a while by Mr. Miner yesterday, says the Hartford *Courant*. Since the vote of the fire board on November 6 that Mr. Miner could demonstrate with his auto, it has answered every alarm, and in a good many instances it beat out apparatus located nearer the fire than the auto station. It had a dozen runs in the time it was in service, proved very handy at the Pleasant street ragshop fire Thanksgiving night, and won Chief Krug's approval, for he said last night that the machine had done well. Later in the winter, when there is plenty of snow on the ground, Mr. Miner is ready to demonstrate its powers again, and will have it answer alarms for a couple of weeks or more. When the fire commissioners were talking over the apparatus Monday night the question of the machine's ability to get about in snow was what interested them the most.

Automobiling is recommended by physicians as a health bracer, on the theory, probably, that it is the pedestrian who has that run down feeling.—*Journal*, Kansas.

Automobiling Under the Equator, in Colombia.

By W. E. FRENCH.

BOGOTA, Oct. 14.—There are but two autos in Colombia that I know of, and they are both Cadillacs and are under my care. The first one, a Model A, was brought here something like a year ago, and in bringing it up the fifty miles from the Magdalena river it went over the bank in a landslide from the Cambaa Road and was brought the rest of the way in bullcarts. After a time new parts were procured and repairs made. The mishap has thrown it "out of true," however, and the frame is still that way, but the car runs fairly well. The other automobile is a Model C, which came at the same time that I did in July. Everything is very slow down here. It took more than six weeks to get the car from New York here, and I will say that it came through in very good shape, excepting a few scorch marks, where sparks had lighted the paper packing and burned the paint in several places, giving it a very close call.

This new auto and its driver creates a sensation whenever it goes out on the streets of the city, and if I stop anywhere a crowd gathers in an instant, wondering

Taking a 25 Per Cent. Rise—Note Rope on Wheels.

what evil monster has arrived. The natives peer under the machine to see the wheels go round, and feel of everything about the body and running gear, and if I stand by the auto waiting for my people they feel of my coat, gloves and cap, and discuss whether or not these are a part of the machine.

Bogota, the capital of the Republic of Colombia, is but five degrees north of the Equator, and is at an altitude of about 9,000 feet. The mornings and evenings are very cool—often as low as 48 degrees—and it is rare that it reaches 75 degrees during the midday. During August and September I wore an overcoat every day. Nearly every day we have a fine rain or mist, the clouds hanging low.

Bogota is a typical Spanish city, and has about 150,000 population. The houses are very old, and tiled roofs will be seen everywhere. Nearly all are built around a "patio" or courtyard, with a large entrance door and hallway to it, from which one can enter the rooms. The windows or "ventana" are high and have bars before them, like a jail or guard house, and it is a pretty sight to see the faces smiling through the bars at one as you pass by with an auto.

There are no rules of the road in this country; everyone takes the best he can find, and that is not saying much, for the roads are very rough and poor for automobiles. They are often constructed of stone, varying in size from a hen's egg to a cartwheel. Some are crowned, while others are built flat and covered with soil. After a time the soil washes off, leaving the stones very uneven and often impassable. Nearly all of the streets in the city are constructed of stone, but few of them are smooth enough for an auto to go over faster than three miles an hour, and I do not know of but about six blocks where one could make over ten, if he wished to stay in the auto.

Return to the Garage After a 200-Mile Drive.

Narrow Street in Tunja—Wheels on Both Curbs

I recently returned from a two hundred mile trip to the north of Bogota over the government road, which before the many revolutions was in fair condition. It has very good grades, none more than 10 per cent., but so many political revolutions have interrupted progress and left the road in bad condition. Many bridges have been destroyed, and in places one has to ford streams, taking the banks as best he can. One of the photographs shows the auto taking a grade of 25 per cent. This road leads over some very heavy grades.

On my first trip I ran into a large mud hole that had been partially filled with rocks. The mud was so deep that the sprocket wheel and chain went out of sight and hit some of the rocks and stopped the engine. To get out meant to sink into the mud over one's boots, so I stood on the step, and by hanging on to the seat started up, but could not pull out. Finally it occurred to me that by backing up so that the front wheels came back into the place the rear ones had dug out I could get momentum enough to push through. It was getting dark, and we had to stop for the night before reaching the town that we expected to arrive at. The first place we got to was a road house that had no beds, so we had to sleep on the dirt floor. I had a better bed than the ordinary traveler, however, for I slept on the cushions from the auto, which were much softer than the cold and damp floor. The auto I backed under the projecting thatched roof that protected the doorway.

Such a supper as those Indians got ready for us; first came soup, then second course soup, third the same, and that was all. In the morning we started out, taking along six men, as the road ahead was not in sight, being under water too deep for the car to go through. We had to construct something like thirty feet of roadway, and while doing so pack-mules, horses and cattle

Navigating a Newly Constructed Road in Colombia.

were passing by the score and we had hard work to keep them off our newly made road.

Another photograph shows the auto passing over the freshly made road, composed of brush, weeds, grass, mud and a very little dry earth, and this photo shows how the wheels cut into the soft muck. Soon after getting through this we ran into a washout that was an abrupt drop of three feet. We kicked down the edges and made a run for it, and came through, but left everything loose in the car in the washout.

Afterward we had very good running for a few miles, till we came to the next bridge that was down. Here we had to take a roundabout road over some very steep grades, and hitched on a yoke of bulls to help us up the grades. It was their first pull at an auto, but they drove better than any bulls I should expect to find in the States. They took her up grades so steep that my gradometer went out of sight. First one, then the other, went down, but the driver coaxed them on till we made the top of the hill, when, to my astonishment, we were at the top of the steepest grade down a bluff which in places was at an angle of 45 degrees at least, with a surface of blue clay and slate.

When I got out and went down and came back, I remarked, "We are up against it now good and hard. No man can make that descent with any degree of safety"; but after looking over the ground, and finding no other way except returning three miles, the man with the bulls suggested putting the rope on the rear axle and backing the bulls down the bluff. No sooner said than done. I started up my engine, and with brake hard on and reverse pushed to its limit, we started down that bank.

How those bulls acted was a sight well worth seeing. Foot by foot they backed down. Part of the time they were on their feet and part not, but they held on like a "pup to a root" till we landed at the base.

How I wish I had a picture of that feat! and I never saw the gradometer or thought of it till I was by the side of those bulls, caressing them for their good work, not even noticing that my foot was asleep from holding down the brake. After paying off our men and removing the non-skidding rawhide ropes we started again over a stretch of very fair roads, and made our stop for the second night.

The car was a sight—mud everywhere. We washed some of it off to lighten up the car so she would run in the morning. This night was passed at a very fair road house. The car was the first ever seen in this section and attracted a large crowd, which named it the "Petrolia wagon."

The third day out we ran over some very good roads, the best, in fact, in Colombia, constructed by a blind engineer, by the way. Our next stop was in the city of Tunja, the former capital of Colombia and the oldest Spanish settlement here, noted for its quaint architecture and narrow streets. The photograph gives some idea of the width of the streets, the auto standing across the driveway with wheels touching each curb. Here we attracted more attention than in Bogota, this being the first time an auto ran over its streets. Any time upon stopping the car a crowd of hundreds of men, women and children would collect and gaze at myself as much as at the machine. The only way I could keep the crowd from getting into the car was to start it up either in one direction or the other, and by keeping it moving they would stand back.

After spending a few days here I took on gasoline, oil and water and started out again, the roads being in much better condition, after a spell of fine weather. After an hour's run we reached the backbone of the ridge, about 11,000 feet above sea level, and commenced to descend. Being at such a high altitude, our cooling water boiled at a much lower temperature than if we were lower down in the world, and we had to fill up several times before going up grades on the way to the top. As we started to descend I shut off the motor and coasted for miles at a time. When nearing the bottom of a grade I would throw on the switch and gently let in the high-speed clutch and away would go the motor as merrily as ever, all the better for the rest. In a number of places gangs of men were repairing the bridges and working the road, and at each place everyone would stop and look at the "Petrolia wagon," and not a stroke of work would they do till we were out of sight!

Finding the roads in good condition, excepting for loose stones, we made a fine run, without trouble excepting from sooty spark plugs. My supply of lubricating oil running low, I had to use mixed oil. The tires were not touched during the whole trip, nor did the car fail in any way. I did not meet a coach or carriage till we came within a few miles of Bogota. The appearance of the car upon its return to the garage after its two hundred mile trip is shown in the photograph. I think I had about 100 pounds of mud on each wheel just before entering the city, but, a ford being at hand, I washed a portion off before the picture was taken. This is the Bogota auto salesroom and garage, with the writer at the wheel. Some of the readers may recognize the driver as the same fellow who drove the limousine at the Daytona-Ormond beach last January.

Figures from France.

PARIS, Dec. 1.—Interesting and instructive figures on the evolution of automobilism in France have just been published in a report by M. Hennequin, chief of the office of the Minister of the Interior, to the extra-parliamentary committee appointed to study the automobile question. Coming from such a source the figures can be taken as absolutely reliable, and will form valuable data. The number of automobiles registered in the whole of France for the seven years 1899-1905 is:

Automobiles.

Year.		Increase.	Proportion on preced. year.
1899.....	1,672		
1900.....	2,997	1,325	73.2 per cent.
1901.....	5,386	2,389	85.9 per cent.
1902.....	9,207	3,821	70.9 per cent.
1903.....	12,984	3,777	41. per cent.
1904.....	17,107	4,123	31.7 per cent.
1905.....	21,524	4,417	25.8 per cent.

In France there are from a financial point of view two classes of automobiles, those in private use paying the full tax, and those employed for business purposes, and paying only half the usual taxation. It is thus possible to give figures as to the employment of automobiles in different trades. Ignoring the department of the Seine it is found in France that doctors, veterinary surgeons, dentists, etc., head the list with 1,109 automobiles; factory managers, engineers, architects, contractors and painters employ 359; commercial travelers and agents have 254; distillers, brewers, wine and spirit merchants, 211; carriage makers and job masters, 171; land owners, farmers, millers, milk dealers, 153; cloth, linen, hat, and drapery manufacturers and tailors, 153; iron merchants, ironmongers, nail makers, founders, etc., 125; grocers, pastry cooks, jam and chocolate makers, 92; bankers and exchange agents, 86; clockmakers and jewelers, 65; spinners, 50; sugar makers and refiners, soap and oil merchants, 45; seed and manure merchants, 44; wood merchants, 41; printers and booksellers, 36; other trades, 489; this gives a total of 3,485 automobiles used for business purposes.

The increase in power is shown by the following table, which will be found useful for reference:

AUTOMOBILES OF ALL KINDS.

	No. of horsepower	No. of automobiles	Average horsepower per automobile	Increased difference
1901..	26,427	5,386	4.90	.....
1902..	47,577	9,207	5.16	0.26
1903..	77,486	12,984	5.96	0.80
1904..	120,919	17,107	7.06	1.10
1905..	178,468	21,524	8.29	1.23

PRIVATE AUTOMOBILES.

1901..	22,415	4,427	5.06	.....
1902..	39,314	7,358	5.34	0.28
1903..	61,526	9,922	6.20	0.86
1904..	92,612	12,519	7.39	1.19
1905..	132,323	15,011	8.81	1.42

AUTOMOBILES FOR BUSINESS PURPOSES.

1901..	4,012	959	4.18	.....
1902..	8,263	1,849	4.46	0.28
1903..	15,960	3,062	5.21	0.75
1904..	28,307	4,588	6.16	0.95
1905..	46,145	6,513	7.08	0.92

Owing to the exceptional position, the Department of the Seine, in which is included Paris, is treated separately, the increase in the capital and the rest of the department for the seven years under review being:

	PARIS.		DEPARTMENT OF SEINE, EXCLUDING PARIS.	
	Private automobiles	Business automobiles	Private automobiles	Business autos.
1899..	243	45	48	21
1900..	510	108	41	46
1907..	938	211	71	76
1902..	1,337	336	168	136
1903..	1,845	529	196	183
1904..	2,407	739	231	247
1905..	2,515	1,074	686	352

An amusing scheme—yet one which really seems to be seriously contemplated—is at present before the public in England. The proposition is to construct a special road from London to Brighton for the sole use of automobiles. The distance is fifty-five miles, and the track would be constructed at the side of the existing roadway, the estimated cost being $5,000,000. There would be no sharp corners and no hills, as the road would be graded like a railroad track. The whole scheme is rather absurd, for in the first place the existing roads will easily accommodate the greatest possible amount of traffic which could arise in the next fifty years. Except to the "scorcher" pure and simple, there would be very little pleasure to be derived from driving along a monotonously level track with nothing to do but steer. It is hardly likely that anything further will be done in the matter, but it serves to show the trend of popular opinion, namely, that the sole pleasure of motoring is speed.

French Runabout Six-Day Reliability Contest.

PARIS, Nov. 28.—Two-fold interest attached to the voiturette touring contest which terminated to-day; it was a test so thorough, so practical and so conclusive in results as to make it of interest to everyone connected with automobilism; and it was also a serious attempt to encourage the construction in France of the cheap, reliable runabout which has been so much studied in America and so much neglected here.

The regulations provided for machines with a minimum cylinder capacity of one liter, chassis weighing between 550 and 1,100 pounds, body weighing not less than 110 pounds and two passengers on board weighing together 308 pounds.

Twenty-two cars, representing twelve different forms, entered for the event, and thirteen starters, representing eight constructors, were sent away on November 20. The task before them was to cover 206 kilometers (128 miles) daily for six days in succession, at an average speed of 15 1-2 miles an hour, including all stoppages from whatever cause and with no repairs or readjustments except with the tools carried on the car and during the actual running time.

The start was made at 7 o'clock in the morning from the Darracq factory in the suburbs of Paris, and a run of sixty-four miles made in a northwesterly direction over roads of varying qualities and grades, one of the stiffest climbs being the well-known Gaillon hill. During the midday meal the cars were placed under lock and key and watched over by a vigilant road commissioner, and when they got back to Suresnes at the end of their daily run they again entered the big hall of the Darracq factory and were jealously guarded all night by a staff of police until five minutes of the official starting time.

On the morning of the first day a thick blanket of snow lay upon the ground, and under this the roads were in bad condition because of the bad weather of the previous day. Transport by animal traction was slow and was carried on under great difficulties, but the automobiles were little affected by the conditions, and of the thirteen starters only two had to abandon the day's run, one of them a Lacoste & Battmann, because of the loss of a wheel as the result of skidding, and a Hugo car, which turned over, also owing to a side slip.

Three De Dion-Bouton cars, driven by Bardin, Cormier, and Lionel De Dion, all finished the run without the loss of a single point. The penalty was five points for each hectometer less than the average of twenty-five kilometers an hour, timing being done over four different sections of the road each day. The De Dion-Bouton team covered the total distance at an average speed of over thirty-two kilometers (twenty miles) an hour, and although this did not give them any advantage over their competitors that covered exactly twenty-five kilometers an hour, it showed remarkable running power under the worst possible road conditions. A Lacoste & Battmann car also finished without any penalty, as did two out of the three forming the Grégoire team. The five others that finished were penalized from 95 to 790 points.

The second day conditions were better, road surfaces being comparatively good, with the exception of a frightful stretch of road for ten miles out of Paris. Five cars finished the second day without the loss of a single point on the two days' performances, an average speed of more than twenty-one miles an hour being maintained over the entire distance by four of the competitors. The De Dion-Bouton team, a Lacoste & Battmann car and a Grégoire were the five victorious ones. All the eleven starters, however, finished the run.

A thaw had set in on the third day, and the cars covered their daily task to the accompaniment of rain, wind and mud. It seemed too much to ask for an average speed of twenty-five kilometers an hour under such conditions, but no fewer than seven cars accomplished the difficult task, and at the end of the third day Cormier's De Dion-Bouton, Gachet's Lacoste & Battmann and Renoncé's Grégoire had not a single point against them. Lionel De Dion's and Bardin's De Dion cars were penalized only owing to the drivers' own fault.

On the fourth day not a single penalty point had to be charged, although the roads, instead of improving, had become worse owing to the melting snow and heavy rain. A De Dion-Bouton, a Lacoste & Battmann and a Grégoire were all three absolutely free from penalization, and nine cars were still in the running.

The end of the fifth day saw two cars, Cormier's De Dion and Gachet's Lacoste & Battmann, without any point against them. Renoncé, who with his Grégoire car had been at the head of the list for the first four days, found his tires had blown out during the night, and although he was, by exception, allowed time to replace them, the same misfortune befell him before he had got ten yards on the road, and he was obliged to quit. Thus eight cars were competing at the end of the fifth day.

Sunday, the sixth and last day of the regularity run, opened with rain, when the nine competitors were sent away. The day's sport was soon spoiled, for a portion of the road had been literally strewn with long nails bent into a special shape in order to more surely puncture the tires. Indignation is great against the criminal responsible for such an ignoble act, and energetic measures will be taken to discover the culprit or culprits. A reward of $700 has been offered for information that will lead to their arrest. Owing to this, the run was shortened and no official figures were given pending an inquiry by the Automobile Club of France.

The contest terminated by speed test, one kilometer on the level, a kilometer hill-climb and 500 meters with standing start and finish. The fastest time for each test was not penalized, those making a slower time were penalized one point for every fifth of a second below the fastest time. On the kilometer level, Lionel De Dion showed the fastest time—1 m., 40 s.—and for the three tests was also at the head with only 86 points penalty. Gachet, on a Lacoste & Battmann, was second on the three tests, with 127 penalty points, being at the head of the 500 meters standing start and finish; and Barriaux, who climbed the hill in the fastest time, came third in the three tests.

The final position is not exactly known. If the Automobile Club of France should annul the portion of the road on which nails were scattered, the result will be:

1. Lacoste & Battmann (Gachet).
2. De Dion-Bouton (Cormier).
3. Vulpès (Barriaux).
4. De Dion-Bouton (Lionel De Dion).
5. De Dion-Bouton (Bardin).
6. Lacoste & Battmann (Thomas).
7. Grégoire (Taveneux).
8. Lacoste & Battmann (Rochay).
9. Grégoire (Renoncé).

If, however, the nail-strewn portion has to stand as a part of the contest, the first four places will be: 1. Vulpès (Barriaux); 2. De Dion-Bouton (Lionel De Dion); 3. De Dion-Bouton (Cormier); 4. Lacoste & Battmann (Gachet).

Mediterranean Auto-Boat Program.

PARIS, Nov. 21.—By a happy unanimity the numerous regattas and auto-boat events which form one of the great attractions of the Mediterranean during the early months of each year, will in 1906 be so arranged as to make one complete series of events, thus allowing competitors to take part in every meeting, permitting spectators to follow all of the races, and at the same time leaving to each of the gay pleasure towns, so often inclined to look upon one another jealously, its own particular event.

Foremost among the events is, of course, the Monaco meeting, with its $20,000 in prizes and its fleet of sixty or seventy boats. Then comes the Mediterranean Cup, given by C. L. Charley, and run this year for the first time from Algiers to Toulon. No boat finished the run, and the only craft capable of undertaking such a journey—the American automobile cruiser *Gregory*—arrived in Europe too late to start; but this has not deterred the organizers from arranging another long-distance cruise next year. The Nautical Club of Nice will conduct a cruise along the coast, and the town of Cannes will take charge of the Burton Cup.

Next year the season will open, as heretofore, with the Monaco meeting from April 1 to 15. On April 16 the fleet will proceed

to Nice, where banquets will be given, regattas held and the Meyan Cup competed for. The next day, April 17, the Chauchard Cup, a cruising event from Nice to Toulon, will be held. This will also serve as an eliminating race for the Mediterranean Cup. On April 17 and 18 various races will be held in Toulon harbor and numerous fêtes in the town, and on the 20th the start will be given for the Mediterranean Cup. Instead of being competed for between the African coast and the French naval base, the cruise will be eastward between Toulon and Palermo. The first stage will be Toulon—Cannes—Nice, the arrival at Cannes being fixed for midday, and Nice in the evening, the Alexander Burton Cup being competed for between Cannes and Nice. The real struggle for the Mediterranean Cup commences on April 21, with a run from Nice to Gênes; still hugging the Italian coast, the competitors will proceed on April 22, 23 and 24, and on the 25th the run will be from Naples to Palermo. In this last stage there are special prizes, in addition to the part it plays in the Mediterranean Cup, the *Coppa della Navigazione* offering a work of art of the value of $2,000 and $4,000 are given in other prizes.

April 26, auto-boat races will be held in Palermo harbor, with a prize list of $1,000. Two steamships will follow the entire cruise, carrying mechanics and spectators, as well as the competitors and cars entered for the Targo Florio road race to be run after the Mediterranean cruise, on the island of Sicily. Naturally, the details of the auto-boat cruise, which has been named the Latin Circuit, have yet to be arranged, but from the outline already drawn up, it is safe to predict one of the most interesting motor boat events yet held.

BRITISH 4,000 MILE TIRE TEST.

The A. C. of Great Britain will conduct a 4,000-mile trial of tires, commencing February 1. The test will be carried out as far as possible under ordinary touring conditions; the tires are to be of standard touring type and will be chosen from stock by the club. For pneumatics there are four classes of cars, with total running weight, including passengers, of at least 1,500 pounds, 2,400 pounds 3,000 pounds and 4,500 pounds, respectively. Armored pneumatics (including the various non-skid bands) have a class with minimum weight of 3,000 pounds. Four classes are provided for solid rubber tires, the heaviest class having 14,000 pounds running load. The trials will be run off at about 200 miles per day, and, of course, under close official observation.

Spring wheel devices will not be allowed. These have already been well tested in recent private trials under the club's auspices. Without doubt, the trials will prove very instructive, and should effectively demonstrate the great progress made in tire construction since the previous club trials in 1903.

French Salon Opens.

The French Automobile Salon in the Grand Palais, Paris, was formally opened by President Loubet on Friday morning, December 8. The French President drove to the exposition in a horse-drawn vehicle at ten o'clock in the morning and made his way at once to the Brasier stand, where the famous Gordon Bennett trophy was exhibited for the second time. M. Loubet spoke briefly to M. Brasier and M. Thery and passed on to other stands, stopping at the exhibits of Panhard, Bollée, Renault, Krieger, Gobron-Brillie, Fiat, Darracq and Mercedes cars. After this inspection the President entered an automobile and was taken to the Serres de la Ville, on the bank of the Seine, where commercial automobiles, autoboats and a few balloons were on exhibition.

The old desire of automobile manufacturers to bring out something strikingly original has practically disappeared, judging from the brief advance reports of the exhibits at the Salon, and there is apparently a remarkable uniformity of design among the majority of the machines shown. A great deal of attention has been given to the perfection of details, and many devices that not more than a year ago were considered good enough even for an expensive car have been discarded for something better. The Mercedes cars, for instance, are now fitted with mechanical force feed lubrication instead of the air pressure feed hitherto used. Air pressure is now used on the Mercedes cars only to force the oil from the main tank into the mechanical lubricator. A number of prominent makers exhibit devices by which the motor may be started from the seat, among them Brasier, Renault and Mors. The Salon remains open until December 24.

ENGLISH TRI-CAR WITH 8-HORSEPOWER, TWO-CYLINDER ENGINE AND AUTOMOBILE SPRINGS.

Typical English Tri-Car.

The tri-car shown in the accompanying engraving is an interesting example of a type of machine that is at present very popular in England. Whether the tri-car is a development of the old motor tricycle or of the motor bicycle with forecar attachment it is difficult to say; the machine combines many of the qualities of both, with the addition of not a few features of the light runabout. Sometimes the tri-car is made with a single seat, in which the passengers sit side by side; in such cases the machine is a car in all but name and the fact that it has but three wheels.

The machine illustrated, built by the Rex Motor Manufacturing Company, of Coventry, has steering gear, lever control, spring system; two-speed transmission gear, thermo-syphon water cooling system and double brakes like a regular runabout. The motor has two cylinders and is rated at 8 horsepower.

Tri-cars are invariably fitted with wire wheels. Owing to their light weight, usually from 400 to 500 pounds, and comparatively high power, they are usually excellent hill-climbers and fast on the level; they are convenient to handle in traffic, are inexpensive to maintain and the first cost is not great, ranging from about $250 to approximately $575.

FOREIGN NEWS NOTES.

The German automobile department at the forthcoming Milan world's fair promises to be a fully representative one, as the government has placed the matter in the hands of the German Automobile Club. The exhibition is in celebration of the opening of the Simplon tunnel, and will be a very important one.

* * *

The next English Tourist Trophy Race will, in all probability, be held in May instead of September, as it was this year. It will be held on or about the same date as the Gordon Bennett trials usually were.

* * *

Heated winter cars are now plying between London and Brighton, as the summer motor-bus service has been superseded by a service more suitable to climatic conditions. The winter vehicle has a smoking and a salon compartment, and is extremely comfortable. The fare for a return ticket is only 7 s. 6 d. ($1.85), and 40 pounds of luggage can be taken down free of charge. There are no outside seats on the winter omnibus, which is a welcome innovation.

GREGOIRE CAR THAT COMPLETED FOUR DAYS OF FRENCH RUNABOUT RELIABILITY TRIALS WITH A CLEAN SCORE.

BARDIN IN ONE OF THE THREE DE DION-BOUTON CARS THAT FINISHED THE CONTEST WITH CREDIT.

GACHET IN LACOSTE & BATTMANN VOITURETTE, WINNER OF FIRST PLACE IN SIX DAYS' RELIABILITY TEST.

New Columbia 28-H. P. Touring Car.

A NEW Columbia model, a gasoline touring car of 24-28-horsepower, will be among the automobiles placed on the parket for 1906 by the Electric Vehicle Company, of Hartford, Conn., and will be known as Mark XLVI. Among the interesting features of this car are the make and break ignition system with magneto, the three-point suspension of the motor and the transmission gearcase and the high speed of which the motor is capable, the maximum being given as 2,200 revolutions a minute. Ordinarily, the motor runs under a governor. Drive is by propeller shaft and bevel gears; sliding gears give three forward speeds. The 18-horsepower Columbia car with double opposed cylinder motor transversely hung under the hood in front, and 40-45-horsepower four-cylinder car complete the Columbia gasoline models; the two last mentioned are practically the same as the 1905 models, only a few detail changes having been made.

The cylinders of the new car are cast in pairs, with integral water jackets arranged to give a free flow of the cooling water; heads and valve housings are also cast integral with the cylinders, the usual openings, closed by screw plugs, being left in the heads of the cylinders and of the water jackets. The valves are all on the left-hand side of the engine and are all mechanically operated by a single camshaft (*B*, Fig. 1); the exhaust valves are considerably larger than the inlet valves. Steel forgings are used for the valves, heads and stems being integral. The valve cams act directly on rollers on the lower ends of the push-rods; the latter are fitted with adjustments for length. The push-rod guides are closely fitted into counterbores in the top of the crankcase and are held in position by yokes, one yoke and one stud serving to hold each pair of guides. The valve stem guides, which are very long and extend well into the valve housings, are screwed into place. The lower end of the valve spring rests on a washer supported by a pin passing through the valve stem. In case it is desired to remove the valves, the spring tension may be released by passing a forked lever under the spring seat or washer and resting the end on lugs cast on the cylinder wall for the purpose; by raising the lever against the washer and compressing the spring, the pin may be withdrawn and the spring allowed to extend and leave the valve free to pass up through its guide; the usual openings are provided over the valves for removal.

The cylinders have a bore of 4 inches and a stroke of 4 1-2 inches and are bolted to the two-piece aluminum crankcase; the upper half of the crankcase carries the three crankshaft bearings. These are of nickel babbitt, and are very long. The connecting rods are of H-section, and, as is shown in Fig. 1, the crankpin bearings are offset.

The make and break ignition apparatus, illustrated in Fig. 2, is operated by large cams carried on a special camshaft *B* on the side of the crankcase opposite to the valve camshaft. The ignition push-rods are lifted by the cams against spring pressure, a single spring being made to answer for each pair of rods; the spring may be seen in Fig. 2. The spring is placed midway between the two rods, its lower end anchored to a fixed point and the upper end attached to a yoke, the ends of which pass through slots in the push-rods. The ar-

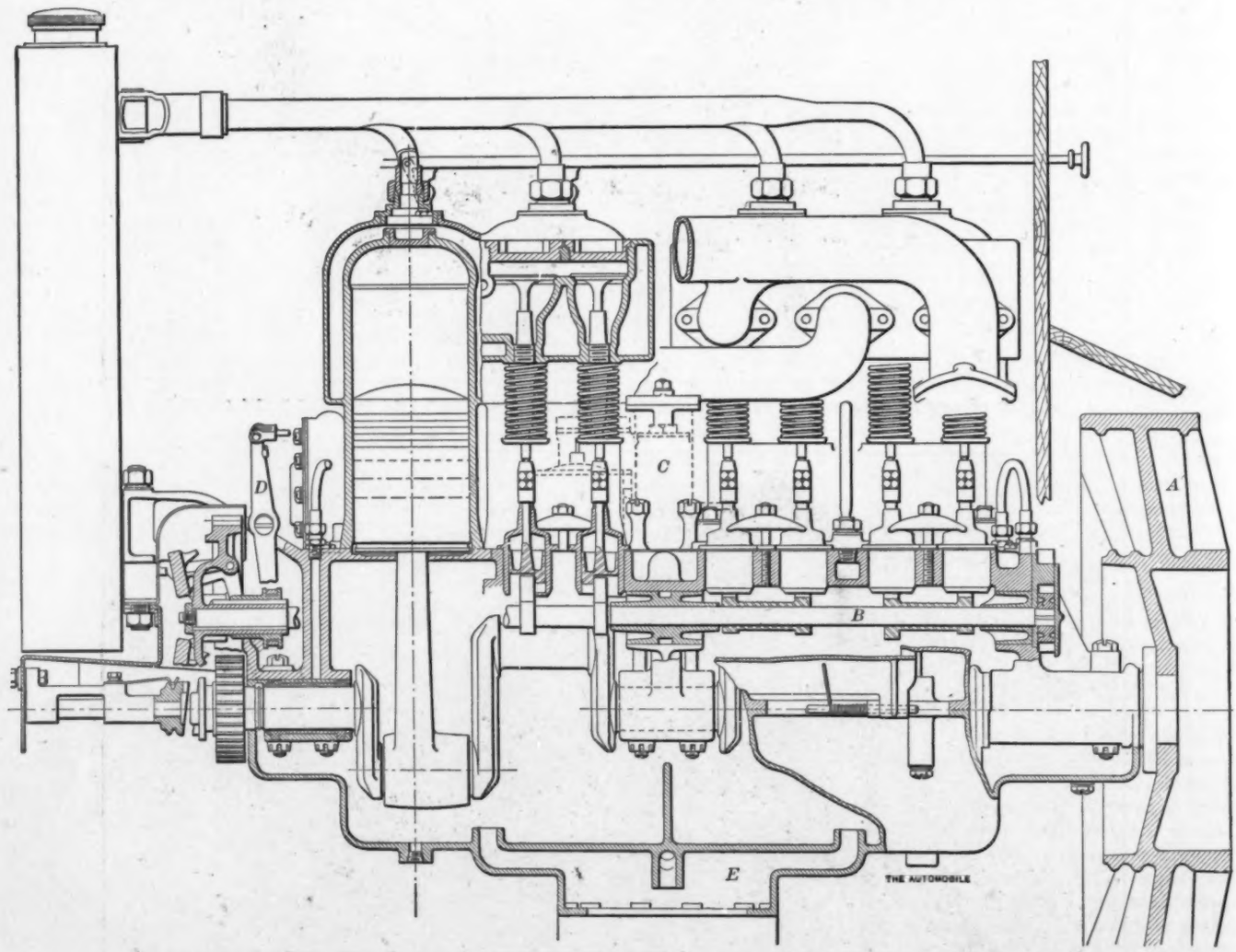
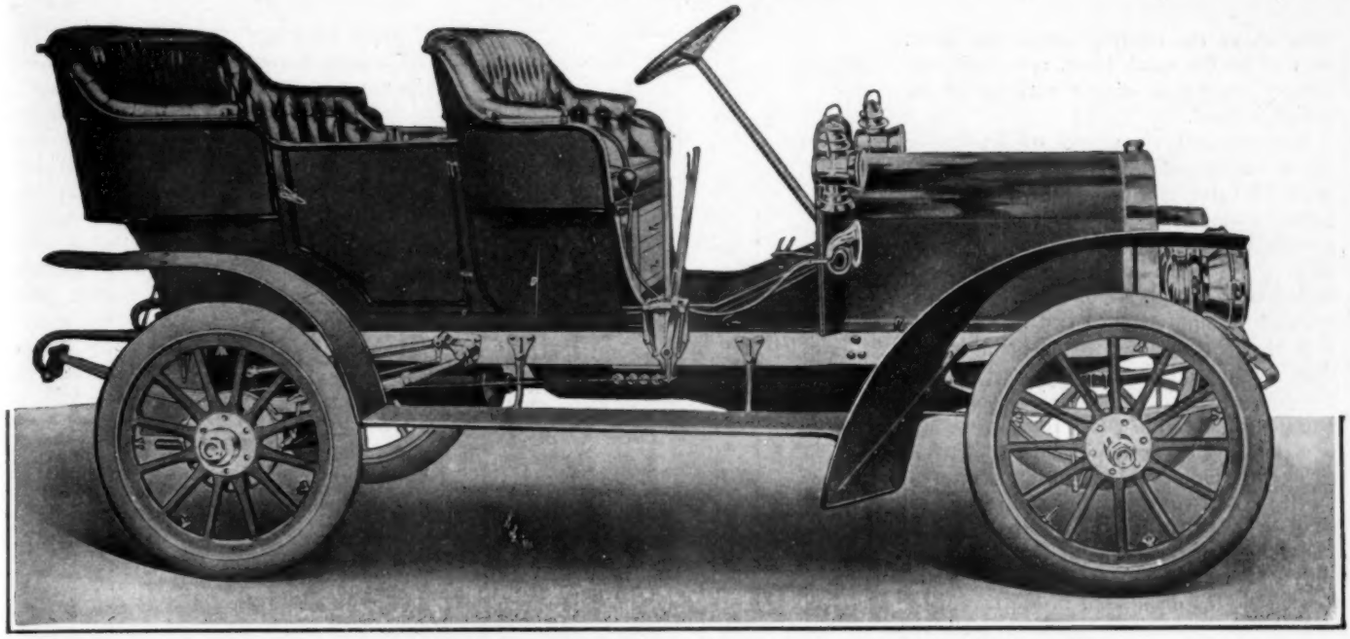


FIG. 1.—ENGINE OF 24-28-HORSEPOWER COLUMBIA MARK XLVI TOURING CAR, PARTLY IN SECTION



COLUMBIA 24-28-HORSEPOWER, FOUR-CYLINDER CAR FOR 1906, TO BE DESIGNATED MARK XLVI.

rangement is simple and avoids unnecessary duplication of parts. The igniter mechanism is carried on a plate and consists of a double-armed lever, one arm, called the hammer, being inside the cylinder, and the other outside; and an insulated stationary pillar, called the anvil, with which the moving arm in the cylinder makes contact periodically. The moving arm is normally held out of contact with the anvil by a helical spring outside of the cylinder. When the push-rod rises on the cam it raises the outside arm and brings the hammer against the anvil in the cylinder, closing the circuit and allowing the current to flow. The cam allows the push-rod to drop suddenly and the hammer breaks contact with the anvil with equal sharpness, causing a short, hot arc between hammer and anvil. The profile of the cams is so formed that by sliding the shaft longitudinally the time of the break is varied. A collar on the camshaft, a fork and a connecting lever, the latter being outside the crankcase and adapted for connection with the ignition control lever, serve to shift the camshaft.

The low-tension magneto, *A*, Fig. 2, is carried on a bracket cast integral with the crankcase about midway of the length of the motor on the ignition side, and is gear-driven. A single wire carries the current from the magneto to a bus-bar which makes connection with the insulated stationary electrode (anvil) of each igniter, the circuit being completed through the hammer, the motor and the metal of the magneto. The only wire used is the short piece connecting the magneto with the bus-bar; as there are no auxiliary devices, it will be seen that the ignition apparatus is exceeingly simple. Oil cups are fitted for the lubrication of the magneto shaft.

A new carbureter is used on both the 1906 four-cylinder Columbia cars, and is peculiar in being without springs and without a needle valve or other means of adjustment, according to the statement of the manufacturers. The carbureter is automatic, having auxiliary air inlets opened, as the speed of the motor and the suction increases, by a floating piston working vertically in a cylinder; as the suction decreases the piston falls by its own weight, cushioned by air in the bottom of the cylinder, and closes the auxiliary air holes. The size and weight of the piston are adjusted to a nicety at the factory. The throttle is of the barrel type and is placed horizontally in the mixing chamber at the point where the gas intake pipe leaves the carbureter. A pedal accelerator on the footboard operates the throttle, which is not connected with the governor in any way. The governor of the fly-ball type acts on a by-pass valve, separate from the throttle, and is regulated by a small

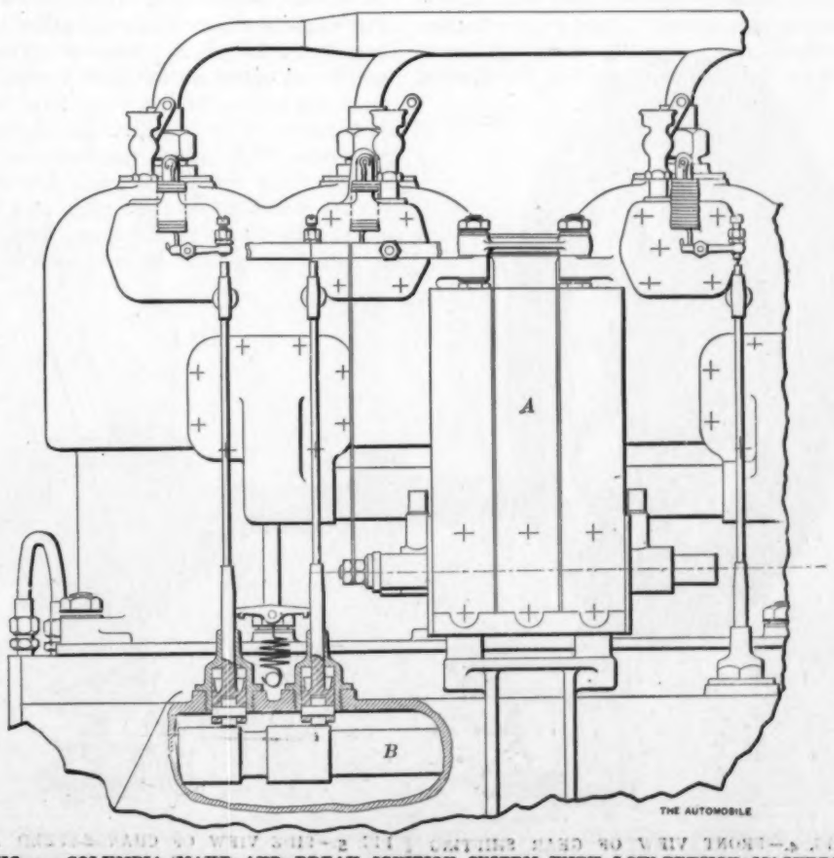


FIG. 2.—COLUMBIA MAKE AND BREAK IGNITION SYSTEM, WITH LOW-TENSION MAGNETO.

lever above the steering wheel, this lever, as well as the spark lever, remaining stationary regardless of the turning of the steering wheel.

A continuous circulation of lubricating oil is maintained by a gear pump driven from the valve camshaft. The pump is capable of working up to a pressure of 15 pounds to the square inch. Oil is taken from a reservoir, *E*, Fig. 1, cast in the bottom of the crankcase of the motor, and is pumped through conduits cast in the upper half of the crankcase, to the main crankshaft bearings, the camshaft bearings and the push-rod guides. The excess oil runs into the crankcase, in which the proper level is maintained by stand-pipes or dams. The oil overflowing from the crankcase returns to the reservoir, passing through a strainer as it descends, and is thus kept in constant circulation. Splash is relied on to lubricate the connecting-rod big end bearings; a slotted diaphragm in the mouth of each cylinder prevents an excess of oil from working into the cylinder and getting on the make and break ignition contacts. An auxiliary oil tank is hung on the frame; the car can be run about 400 miles on one charge of oil.

The method of making the crankshaft is the same for both the four-cylinder cars, and consists of roughing the shaft out of a solid slab of steel and working it down in the lathe; the final operation is the grinding of the journals, which is done with the greatest possible accuracy.

The cone clutch is peculiar in being of small diameter, the necessary friction surface being obtained by making the leather-covered face unusually wide. A small clutch is necessitated because the flywheel is formed with fan-blade spokes (*A*, Fig. 1).

Brass shoes are placed in the friction surface of the clutch, and are said to assist in giving a smooth, progressive engagement. A forward extension of the clutch shaft is carried in a bronze bushing inserted in a bore in the end of the crankshaft. The opposite end of the clutch shaft carries one-half of a universal joint, the other half of which is on the primary shaft of the transmission gear, Fig. 3.

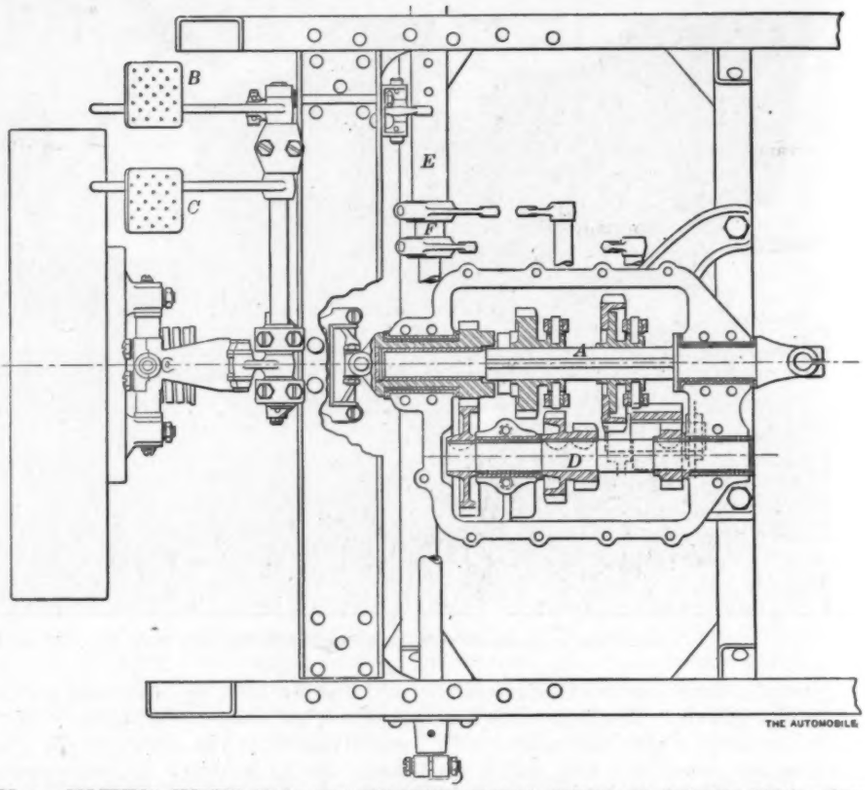


FIG. 3.—COLUMBIA SLIDING GEAR TRANSMISSION SYSTEM, SHOWN IN SECTION FROM ABOVE WITH COVER REMOVED.

The sliding gears give three forward speeds, with control by a selective lever. Two sliding gears, each mounted on a separate boss with collar and fork, are carried on the squared shaft, *A*, Fig. 3. First and second speeds and the reverse are obtained by meshing the sliding gears with the fixed gears on the secondary shaft *D*, while the third or highest speed is obtained by engaging a claw clutch, one half of which is formed on the forward side of the forward sliding gear and the other half on the rear end of the hollow forward part of the primary shaft, the drive then being direct, with shaft *D* running idle. The gears and shaft of the transmission are of a special chrome-nickel steel of great tensile strength. The manufacturers state that the tensile strength of the steel used for the gears, gearshafts, crankshaft and steering pivots is 225,000 pounds per square inch, while the elastic limit is 135,000 pounds per square inch.

The arrangement of the selective gear shifting lever is clearly shown in Figs. 4 and 5; the emergency brake lever is also shown, being the shorter of the two (*B*, Fig. 5). The two sliding gears in the square transmission shaft, *A*, Fig. 3, are operated by means of the usual collars and forks, the latter being connected to hollow shafts which may be engaged at will through the hand lever. The hollow shafts work one within the other and are shown in Figs. 3 and 4, marked *E* and *F*. Each carries at its outer end a short arm, one rising on each

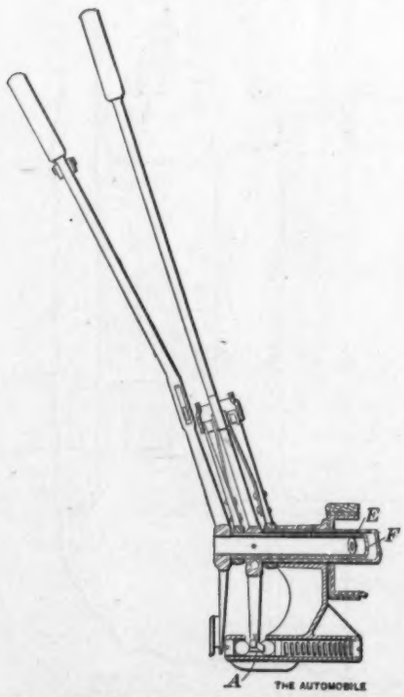


FIG. 4.—FRONT VIEW OF GEAR SHIFTING LEVER, PARTLY IN SECTION.

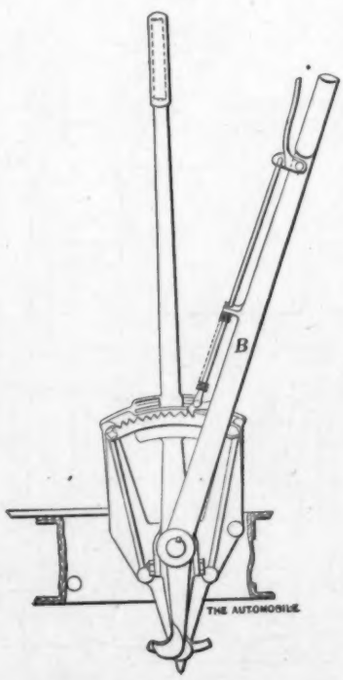


FIG. 5.—SIDE VIEW OF CHANGE-SPEED AND BRAKE LEVERS.

side of the hand lever. The third shaft, in the center of the smaller gear-shifting shaft, is the emergency brake shaft and extends to the opposite side of the car, carrying at each end connections for the brake cable. The arrangement of the shafts and the short arms is made clear by the engravings. Flat springs, one on each arm, press against the lever and keep it normally in a central position. By swinging the lever sideways from neutral position against the spring pressure it engages with lugs on the arm toward which it is moved, and the connecting shaft may be rocked and the sliding gear to which it is linked may be shifted; by again bringing the lever to the neutral position and swinging it in the opposite direction the other arm may be engaged and the other gear shifted. A downward extension of the lever carries a short sector in which are hollows to receive two balls, one pressed by a spring; when the lever is in the neutral position the balls hold it there with sufficient firmness to prevent its jarring out of position. The main advantage of the selective type of transmission gearing is that from neutral position any gear may be reached at once without going through any other gear, when there are but three speeds and reverse operated by a single lever.

Three-point suspension is employed in supporting the transmission gearcase, two arms cast on the rear end of the bottom half of the casing being bolted to a cross-frame, and a single lug in front bolted to another cross-frame. The bearings for the transmission shafts are extremely long and are of phosphor bronze.

A universal joint in the rear of the transmission gearcase joins the primary transmission shaft to the propeller shaft; another universal joint is placed at the junction of the propeller shaft with the short shaft on which is mounted the bevel driving pinion. The live shaft runs on roller bearings; the thrust of the driving gears is taken by ball bearings, one of which may be seen at *A*, Fig. 6. The rear wheels run on roller bearings. One of the wheels is shown removed from the axle and reversed, showing the roller bearings mounted on the tubular housing, and the castellated coupling by which the rear wheel is driven from the live shaft. The spring seats, one of which is seen at *B*, Fig. 6, and the other in the corresponding position on the opposite side of the axle, are made integral with the lugs on which the brake rocker arms are pivoted. The bevel gears and differential are carried in a housing, the top of which is removable, as the engraving shows. Both regular service and emergency brakes are carried on the rear hubs; the regular brakes are constricting bands closed on the steel drums by a pedal, and the emergency brakes are made with cast steel shoes which are forced against the interior surface of the drums by a side lever, the pull being transmitted by a steel wire cable. The bolts by which the drums are attached to the wheel hubs may be seen in the engraving.

A single-piece forging constitutes the front axle, which is of I-beam section;

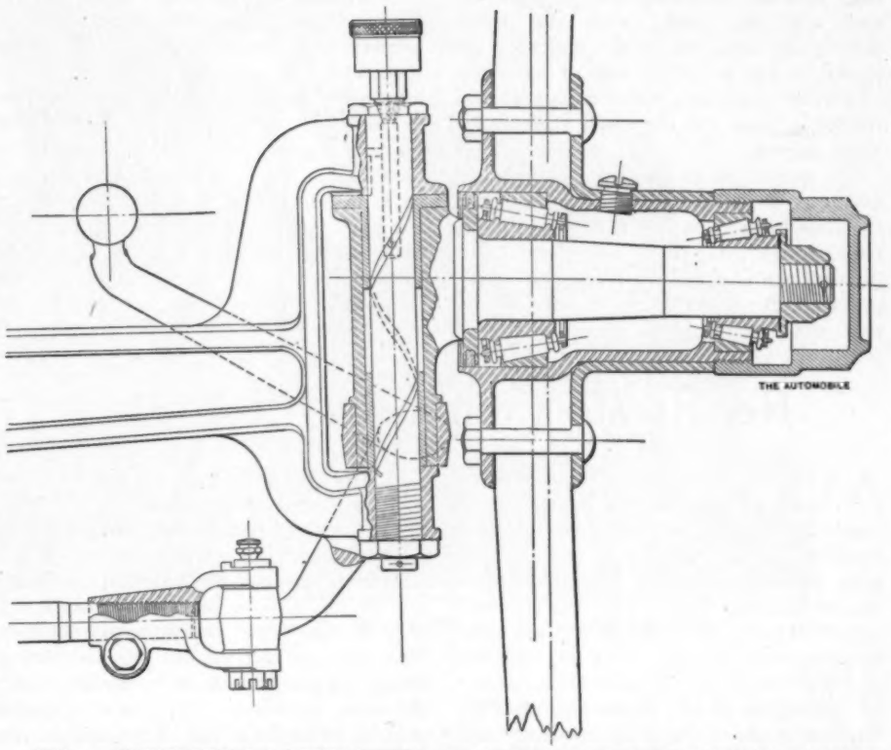


FIG. 7.—ROLLER-BEARING FRONT WHEEL AND STEERING KNUCKLE, PARTLY IN SECTION.

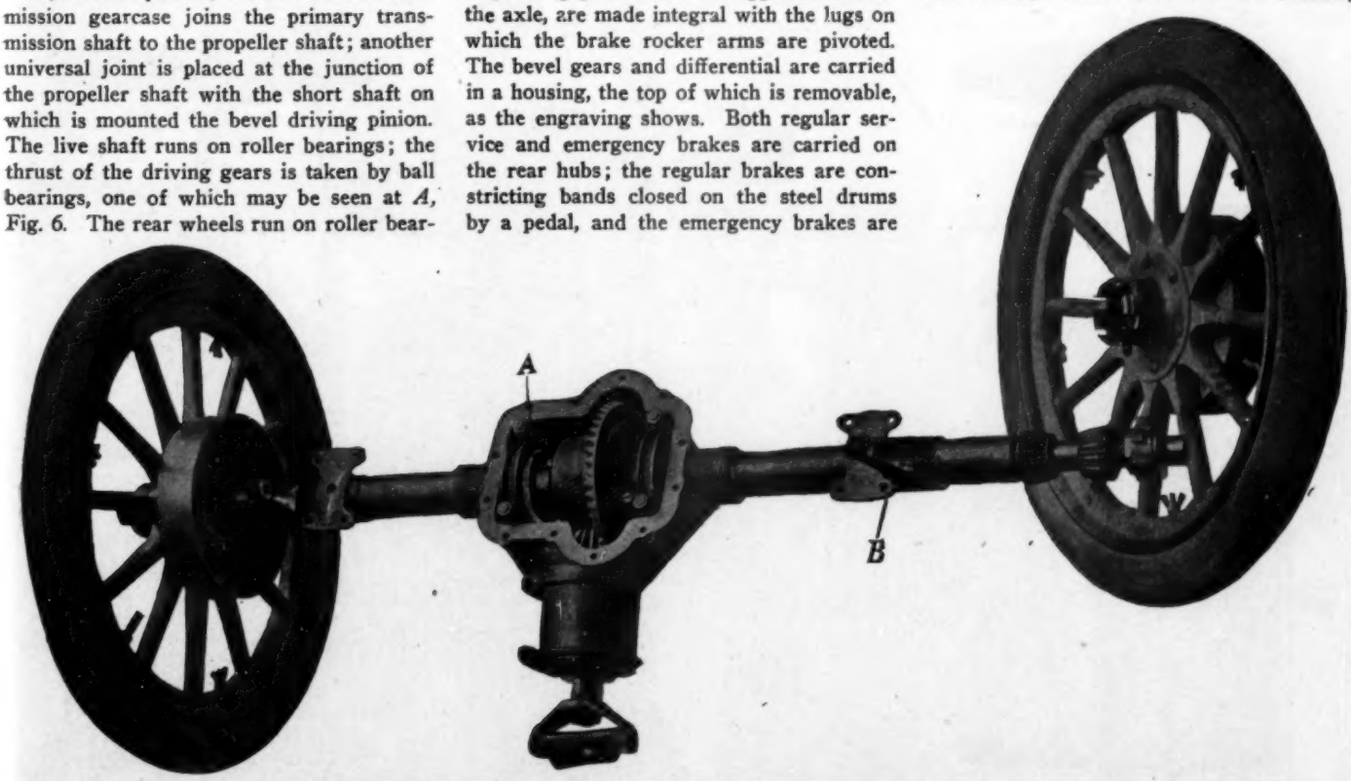


FIG. 6.—REAR AXLE AND WHEELS OF COLUMBIA MARK XLVI CAR, SHOWING ROLLER BEARINGS AND LIVE AXLE DRIVE TO OUTSIDE OF WHEEL.
A—Adjusting Collar for Ball Bearings. B—Spring Block and Brake Lug.

the steering knuckle and connections and the axle stub, with the roller bearings on which the wheel is mounted, are shown in Fig. 7. The frame of the car is of pressed steel, with heavy cross members riveted in place and the whole stiffened by large gussets.

The springs, all of which are semi-elliptic, are of great length; the illustration of the complete car shows this, the length of the rear springs being particularly noticeable. A metal pan encloses the lower part of the car from the radiator to a point in the rear of the transmission gearcase.

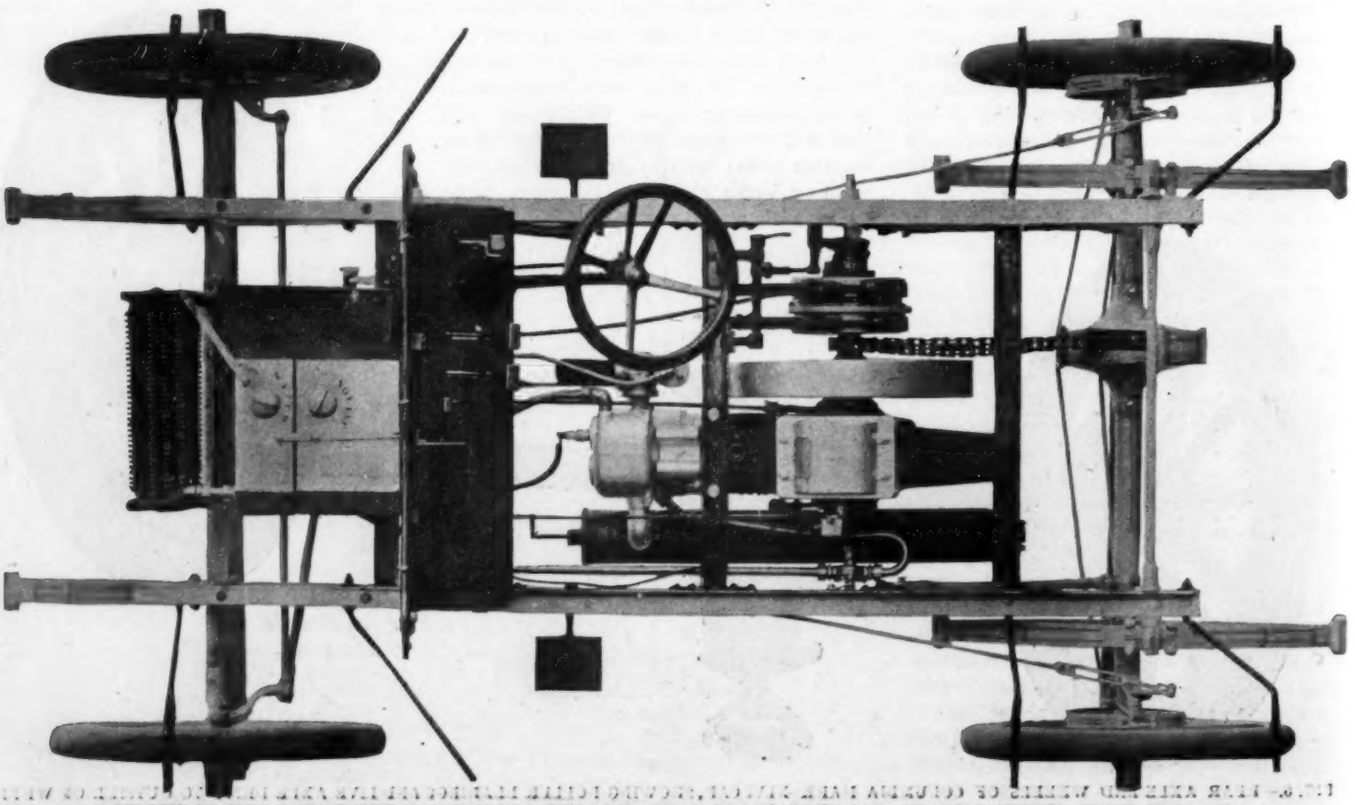
The design of the body, with its straight lines and overhanging seats, is clean-cut and attractive; it will be noticed also that the footboard has an unencumbered appearance, notwithstanding the three pedals. This is due in a large measure to the fact that the steering column passes through the dashboard. The tonneau door, which appears to be of good width, opens forward; the rear seat is designed to afford plenty of room for two adult passengers, while a third may be squeezed in on occasion. The wheelbase is 98 inches and the weight 2,250 pounds.

Reo Runabout with Folding Rear Seat.

AN excellent example of that peculiarly American light car, the single-cylinder runabout, is shown in the Reo 8-horsepower machine, illustrated and described herewith, manufactured by the Reo Motor Car Co., of Lansing, Mich. The Reo runabout is built to carry two passengers in the usual runabout seat, and two more on a folding rear seat, which can be supplied on order; the passengers all face forward. When the rear seat is not in use it folds forward and leaves a flush sloping rear deck with a brass railing. The propulsive power is supplied by a single-cylinder horizontal water-cooled engine hung under the body, driving the live rear axle through a planetary transmission and heavy roller chain.

The simplicity and compactness of the motor are well shown in the line engravings on page 666; a longitudinal vertical section is given, and also a cross section in the vertical plane of the crankshaft. The latter drawing shows the planetary transmission, which employs no internal gears, and the water circulating pump. It will be noticed that all the working parts of the motor are encased, this being well protected not only from dust and dirt, but also from accidental damage, while lubrication is effected under favorable conditions. The valves, located side by side on the top of the engine, are mechanically operated and are of equal size. Valve housings, cylinders and heads are cast integral with integral water jackets; the usual opening for the inspection or removal of each valve is placed opposite the valve. An ingenious method of inserting the valve stem guides has been adopted. Owing to the fact that the cylinder projects into the crankcase for a considerable portion of its length, the distance between the valve housing and the extension of the crankcase through which the valve push-rod passes is so short that a guide would have to be very short if screwed in from the outside, in the usual way. Very long guides are used, however, and they are screwed in from the inside, the guide being passed through the valve inspection opening and the valve port to its place; the arrangement will be at once understood if the drawing is referred to. The camshaft, driven by spur gearing from the crankshaft, lies directly above the latter. The gears are large in order to distribute the wear over a large surface, and, owing to this fact, the camshaft is higher than the valve stems; therefore the push-rods, which are directly actuated by the cams, are offset. The cam ends of the rods work in guides placed as close as possible to the camshaft, while the opposite ends are supported by guides placed in the wall of the casing. Rollers placed in the ends of the rods take the cam thrust. A flanged cap-nut screwed over the end of each valve stem serves to hold the valve spring in place and at the same time takes the thrust of the push-rod. Valve heads are of cast iron with steel stems, the heads being shrunk on the stems and the latter riveted over. The valves have an effective diameter of 1 9-16 inches.

The bore of the cylinder is 4 3-4 inches and the stroke of the piston 6 inches; the piston is 6 inches long and is fitted with three eccentric packing rings, held against turning by pins. The piston is light and is ribbed inside to give stiffness; the gudgeon pin is hung at the centre. The con-

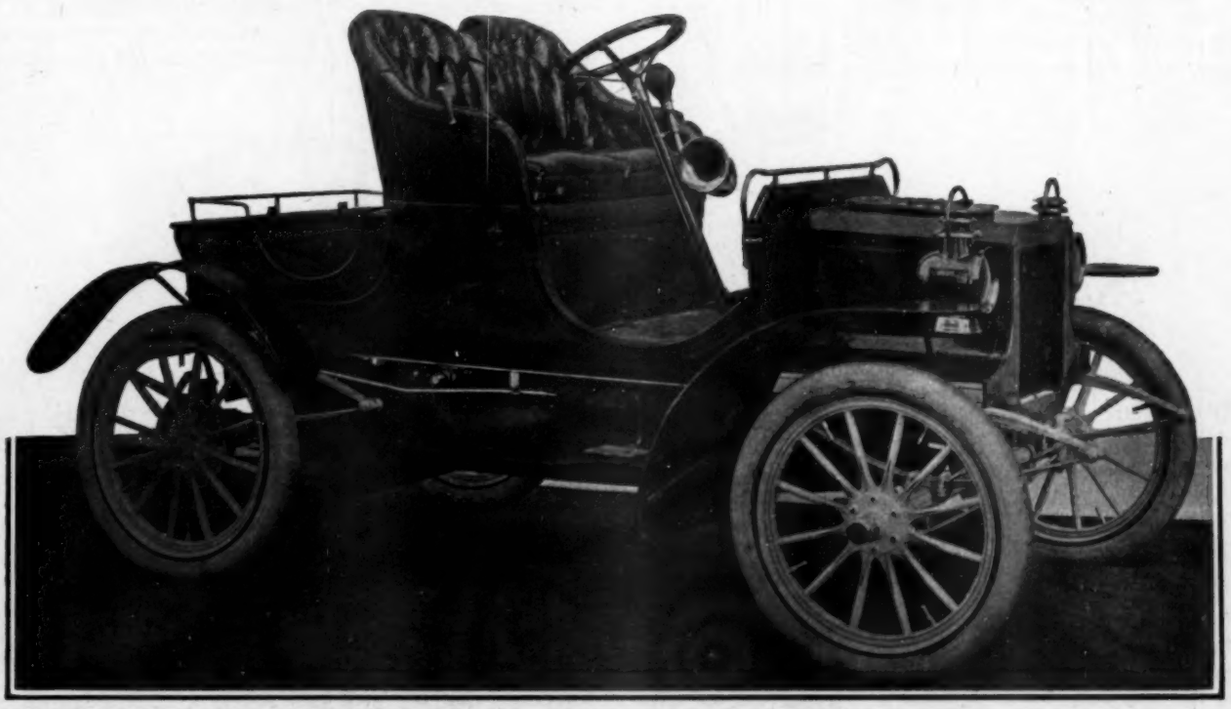


CHASSIS OF REO 8-HORSEPOWER RUNABOUT, PHOTOGRAPHED FROM ABOVE, AND SHOWING FENDER IRONS IN PLACE.

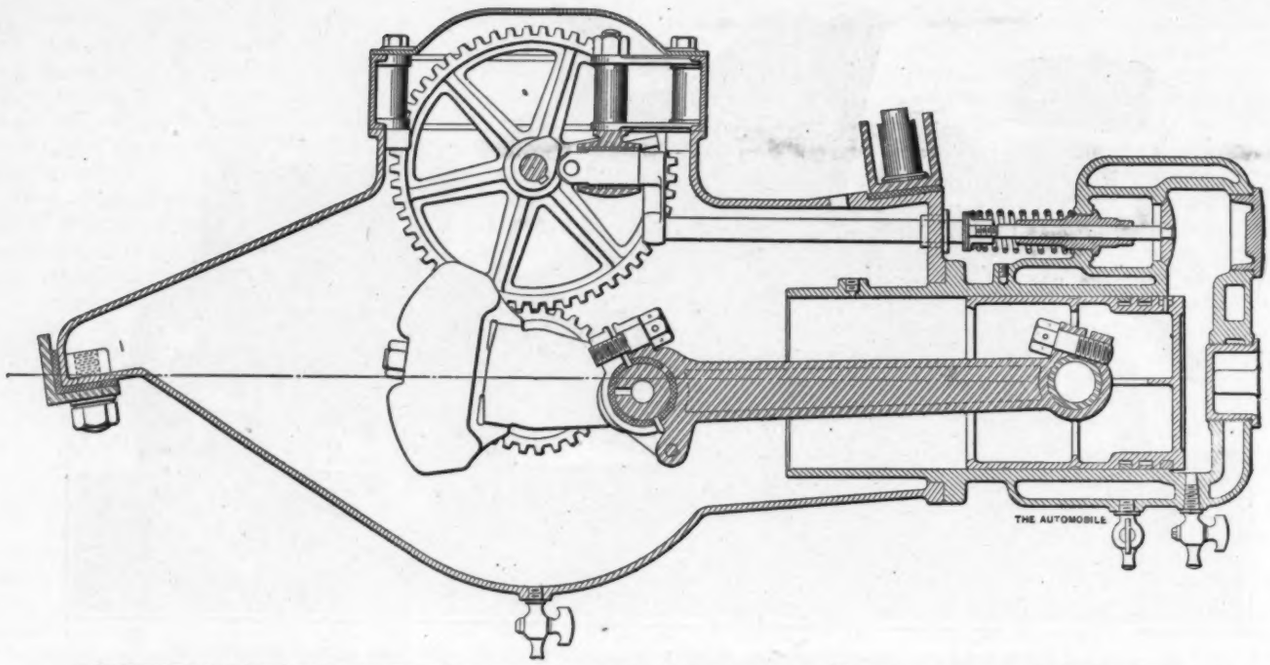
REO 8-HORSEPOWER RUNABOUT FOR 1906, WITH REAR FOLDING SEAT OPEN FOR EXTRA PASSENGERS.

necting rod, 12 inches long, has adjustable bearings at each end; the gudgeon pin bearing is split on one side and fitted with an adjusting screw, while the crankpin bearing is split and hinged; the bolts are split-pinned. The crankpin is 1 9-16 inches in diameter and the bearing is 2 inches long; the gudgeon pin is 1 1-8 inches in diameter. Counterweights are bolted to the crank arms to balance the reciprocating parts, the balancing being done with great care, with the result that the motor runs very smoothly and steadily. The crankshaft is 1 9-16 inches in diameter at the main bearings; the bearing on the flywheel side is 2 3-4 inches long and the bearing on the opposite side 2 3-8 inches long. The spoked flywheel is on the right-hand side of the motor as it is hung on the car, and is 20 inches in diameter, with a rim of approximately rectangular section, 2 3-4 inches face and 2 1-2 inches deep. The crankshaft extends beyond the flywheel to the right side frame of the car, where it is supported by a bearing lubricated by a grease cup.

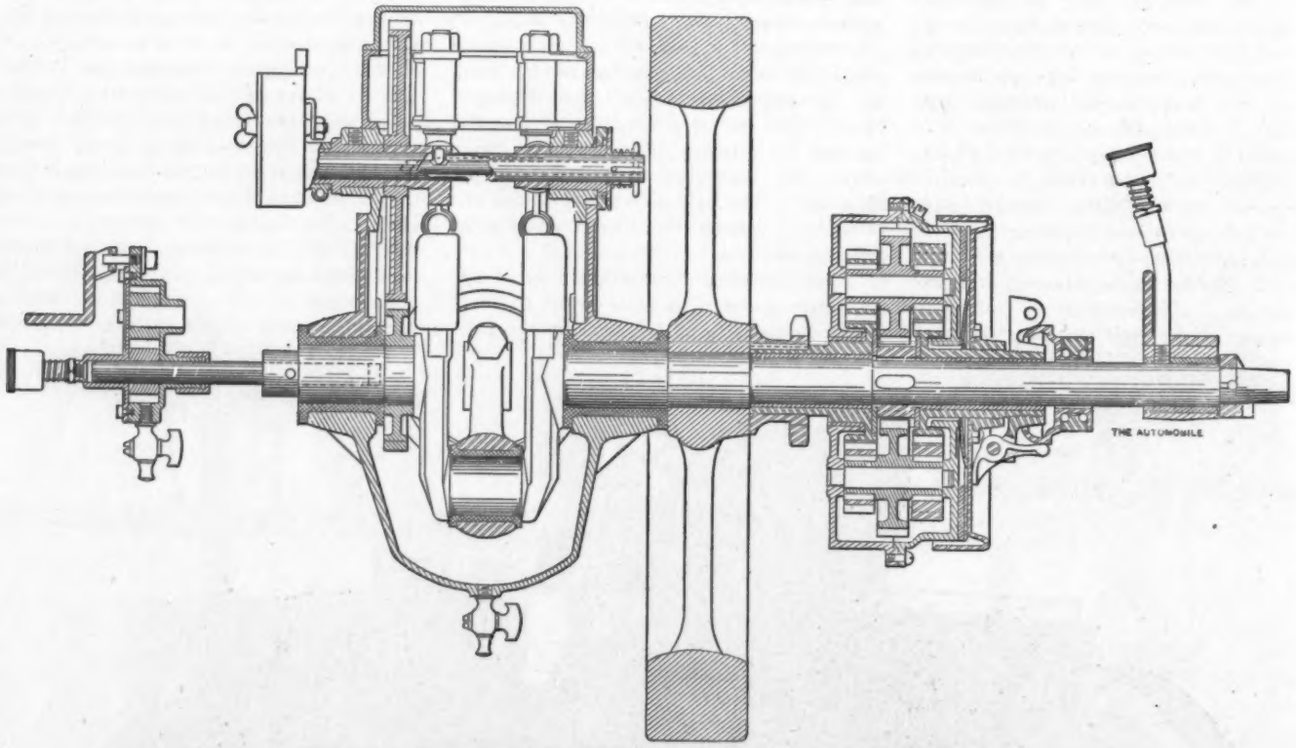
The planetary transmission gear is mounted on the shaft close to the flywheel, sufficient space being left between the gear-case and the flywheel for the sprocket and driving chain; the gearing gives two forward speeds and a reverse, and, as has already been said, comprises no internal gears. The shaft is reduced in diameter where it passes through the flywheel, again outside the flywheel and again in passing through the transmission gearing, leaving the diameter at the outboard bearing 1 3-16 inches. On the opposite side of the crank-case the shaft terminates near the bearing; it is direct connected to the spindle of the gear pump used to circulate the cooling water, the pump spindle passing into a hole



SAME CAR AS THE ONE ABOVE BUT WITH EXTRA SEAT FOLDED DOWN.



LONGITUDINAL VERTICAL SECTION OF REO SINGLE-CYLINDER, 8-HORSEPOWER ENGINE SHOWING CAMSHAFT GEARING.

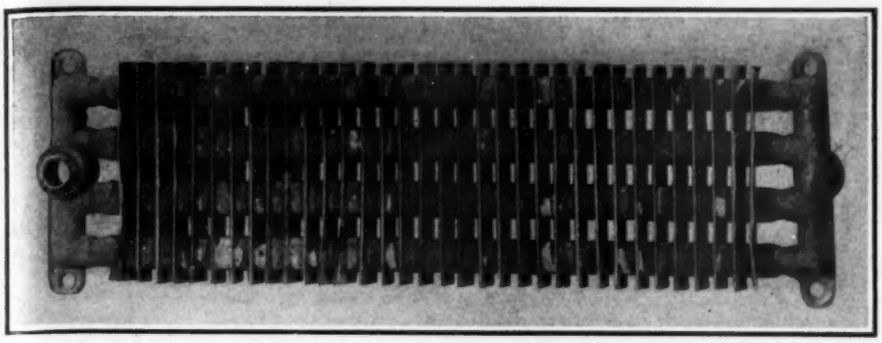


TRANSVERSE SECTION THROUGH REO CRANK CASE AND PLANETARY TRANSMISSION.

drilled in the centre of the shaft, where it is pinned securely. The pump is supported by a bracket attached to the left-hand side frame of the car and is lubricated by means of a grease cup. The crankcase, opposite the cylinder, is extended to form a support which is bolted to a pressed steel cross frame; the other end of the motor is supported from a similar cross frame at the point where the cylinder is attached to the crankcase; lugs cast integral with the crankcase take the supporting bolts. Ignition is by jump spark, two sets of dry cells furnishing the current; the coil is placed in the usual position on the dashboard.

The framing of the car is of angle steel, with pressed steel cross members riveted in place. The springs are three-quarter elliptic in front and full elliptic in the rear. The rear end of each front spring is provided with a slot in place of the usual eye, to allow for the movement of the spring as the wheels pass over obstructions in the road. The front axle is tubular and is straight throughout its length. The rear axle is built up of malleable castings, forming the differential casing, and steel tubes, pinned and brazed into the differential casing; the differential is of the bevel type. Roller bearings are fitted to the rear axle and also to the front wheels; the rear axle is held in position by two radius rods which maintain a constant distance between the crankshaft of the engine and the rear axle and keep the chain at the same tension at all times. Brakes are fitted on the rear hubs and are double acting, external bands, operated by a pedal.

Gasoline and water tanks, of rectangular



ONE OF THE TRANSVERSE COMPONENTS OF THE REO FLAT-TUBE RADIATOR.

form, are made of galvanized iron and are placed under a neat hood in front of the dashboard; the battery box also is under the hood.

The radiator, carried in the front of the open-ended hood, is made up of flat tubes with large fins; the tubes are horizontal and extend between vertical headers on each side. An advantage this form of radiator is said to possess is that, in addition to having a large radiating surface, it is not liable to damage from the freezing of water in the tubes, the flat tubes merely bulging slightly when ice forms. The total capacity of the cooling system is 3 1-2 gallons.

The wood artillery wheels are 28 inches in diameter and are fitted with 3-inch tires; the wheelbase is 78 inches and the tread 55 inches. Steering is by wheel, the gear being enclosed and protected from dust. The capacity of the gasoline tank is 6 gallons, and the mileage on this quantity of fuel is said to be 150 miles, under favorable conditions. The car weighs 975 pounds.

In addition to the runabout, the Reo Motor Car Company manufacture a five-passenger touring car with 16-horsepower double-opposed cylinder motor and a ten-passenger wagonette, using the same motor as the touring car. A new model is a coupé, mounted on the regular touring car chassis; the body is detachable, and the regular touring car body may be used interchangeably with the coupé.

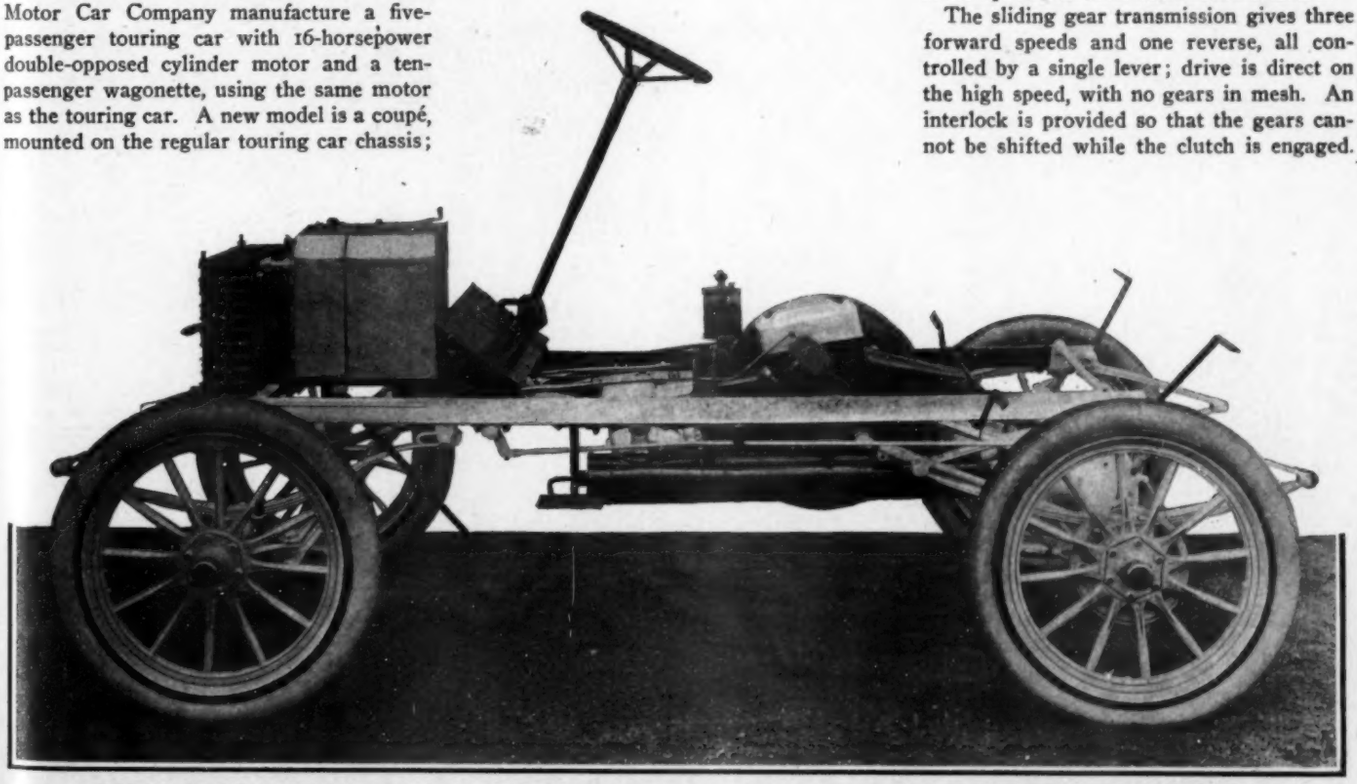
Moline Model C.

Three models will be placed on the market for the season of 1906 by the Moline Automobile Co., of East Moline, Ill., the smallest being a light touring runabout with detachable tonneau, the second a light touring car with 18-20-horsepower motor, and the third a large touring car with 30-35-horsepower motor. The cars are designated as models G, C and A, respectively. Model G has a double-opposed horizontal motor under the body, while the two larger cars have four-cylinder vertical motors in front. The four-cylinder cars are identical except in point of size; model C has cylinders of 3 3-4-inch bore and 4 1-2-inch stroke, 100-inch wheelbase, 32-inch wheels and 3 1-2-inch tires, while model A has cylinders of 4 1-2-inch bore and 5-inch stroke, 110-inch wheelbase, 34-inch wheels and 4-inch tires. All the parts of the more powerful machine are made heavier and stronger than in the smaller car. With these exceptions noted, the following description of Model C will answer for both four-cylinder cars:

The cylinders are cast in pairs and, as is usual in modern practice, have their heads, water jackets and valve chambers cast integral. After boring, the cylinders are reamed and then ground to a true cylindrical finish. Grinding is also employed in finishing the pistons, rings, crankshaft journals, crankpins and other wearing parts. There are four rings on each piston; three are placed above the piston pin, while the fourth passes over the ends of the pin, preventing it from protruding and scoring the cylinder walls. The aluminum crankcase is divided horizontally and the upper half carries the three bearings for the crankshaft, the lower half servng merely as an oil reservoir and being under no strain. Four arms, one at each corner of the upper half of the crankcase, support the motor and are bolted direct to the main side frames, no sub-frame being used for this purpose. The two-to-one gears, as well as the gears through which the centrifugal circulating pump and the fan are driven, are so arranged that steel gears mesh with fiber or rawhide gears, reducing noise from this source to a minimum.

Ignition is by jump spark, a quadruple coil being placed on the concave dashboard. Current is supplied by a 60-ampere storage battery and and auxiliary battery of dry cells, all carried in a box on the running-board on the left-hand side of the car. A Hill precision oiler lubricates the motor.

The sliding gear transmission gives three forward speeds and one reverse, all controlled by a single lever; drive is direct on the high speed, with no gears in mesh. An interlock is provided so that the gears cannot be shifted while the clutch is engaged.



SIDE VIEW OF REO CHASSIS, SHOWING COMPACT ARRANGEMENT OF THE POWER PLANT AND GREAT CLEARANCE BELOW.

The gearcase is of aluminum, with ample openings for obtaining access to the gears; the transmission shafts run in nickel babbitt bearings with ring oilers; provision is made to prevent the leakage of oil to the outside of the gearcase. Lubrication is effected by the mechanical oiler, which forces oil to the various frictional points. The clutch is of the regular leather-faced cone type, the leather being backed by flat springs to make the clutch engage gradually and without jerking.

Drive from the transmission gearing to the rear axle is by propeller shaft and bevel gears, the propeller shaft having a single universal joint. The propeller shaft and the live shafts of the rear axle run in roller bearings; the front wheels are mounted on ball bearings.

The framing of the car is of the usual pressed steel type, and both motor and transmission gearcase are attached directly to the main frames, no sub-frames being employed for this purpose. Both axles are of seamless steel tubing; steering knuckles are brazed and pinned into the ends of the front axle.

The spring suspension is of the three-point type, there being two full elliptic springs in the rear and a single transverse semi-elliptic spring in front. The road wheels are 32 inches in diameter, with 12 spokes each, and are fitted with 3 1-2-inch tires, purchasers being given an option on several makes of tires. The wheelbase is 100 inches.

All brakes are placed on the hubs of the rear wheels, a single drum on each rear hub carrying internal expanding rings, constituting the emergency brakes, and external constricting bands, used as the regular service brakes. The emergency brake is applied by a side lever and the regular brake by a pedal. The application of the service brake releases the clutch. Spark and throttle levers are placed on the steering column, while a pedal accelerator, controlling the throttle, is fitted. A small pedal serves to open the muffler cut-out. Brown-Lipe steering gear is used and is irreversible.

The body is of the straight-line type, with individual front seats and a wide, deep rear seat; the side doors are of good width. The dashboard is of metal, of concave form. Each car is sent out with an equipment consisting of oil side lamps, a horn and a full set of tools in the tool-box on the right-hand side of the running-board.

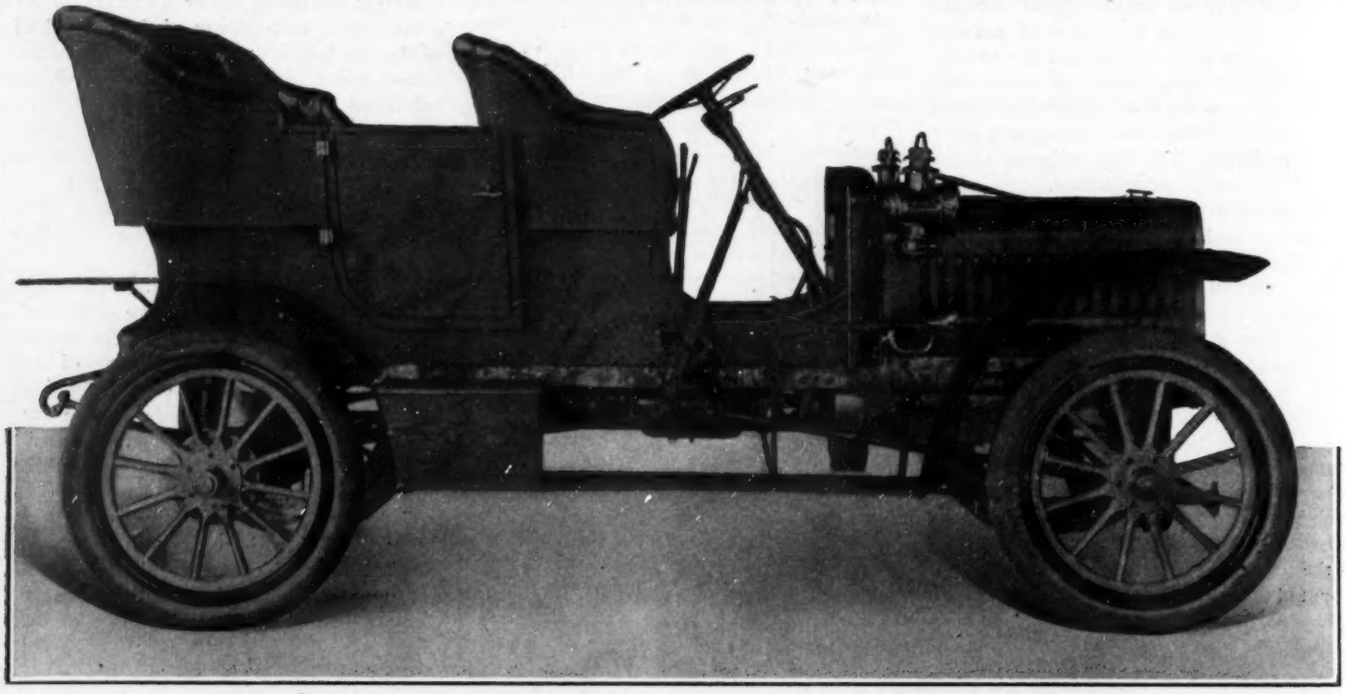
Iroquois Touring Car.

A single model, a large touring car with 25-30-horsepower motor, will be manufactured for the coming season by the Iroquois Motor Car Company, of Seneca Falls, N. Y. The car will be known as Model D, and in general construction will follow regular touring car lines, having a four-cylinder vertical motor, side-entrance body, with individual front seats, roomy tonneau and moderately long wheelbase. The weight is 2,400 pounds, and the maximum speed forty miles an hour.

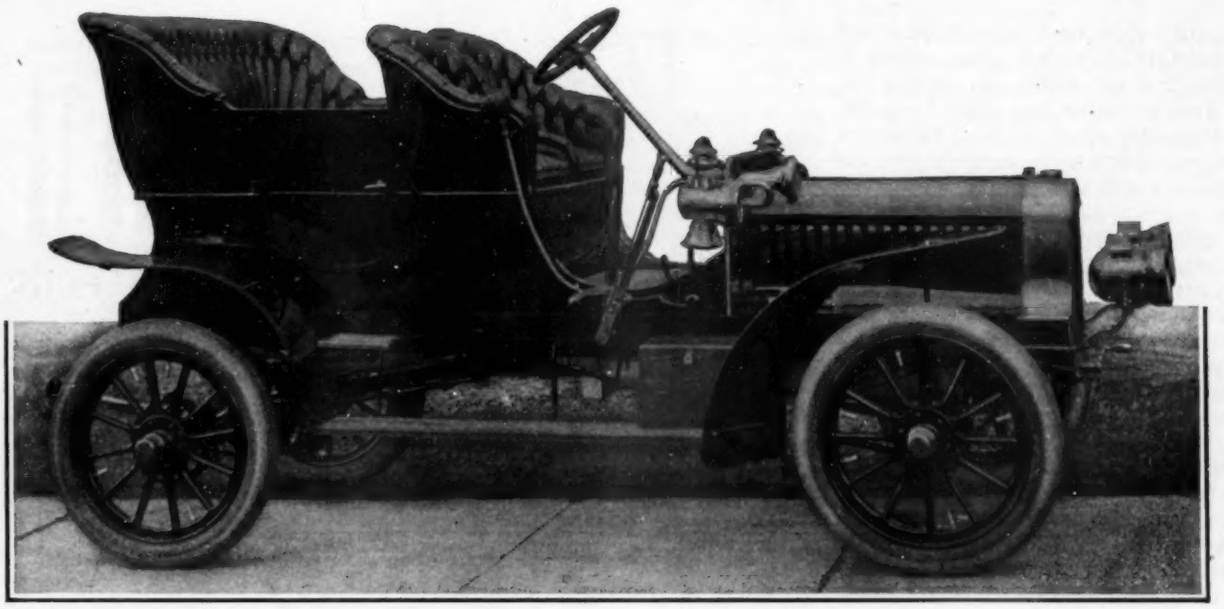
The motor has four cylinders cast in pairs with integral water jackets, heads and valve chambers, and mechanically operated valves. Jump spark ignition is used and two sets of dry cells supply the necessary current. Throttling is effected by hand, as is also the regulation of ignition, the spark and throttle levers being placed on the top of the steering column, above the wheel. The carbureter is placed on the right-hand side of the motor and gas is led to the cylinders through a single straight pipe with a short branch leading off at right angles to each cylinder. The spark plugs are placed in the screw covers which close the valve inspection holes on the inlet side, and compression relief cocks are placed in the covers over the exhaust valves on the opposite side. Six arms are cast on the crankcase for the support of the motor and are bolted to an angle steel sub-frame which extends back and supports the transmission gearcase also.

The clutch is of an expanding type and the manufacturers state that it is free of all end thrust; it is operated by means of a pedal. The transmission gearing, of the clash type, gives three forward speeds and a reverse, with direct drive on the high gear; drive to the rear axle is by propeller shaft and bevel gears, there being two universal joints in the shaft. The transmission gearing is, as usual, enclosed in an oil-tight case and runs in oil, special provision being made for the lubrication of the shaft bearings. A large hand-hole in the top of the gearcase, covered by a plate, gives access to the interior. The universal joints are all large and substantial. The live rear axle runs on roller bearings. Radius rods pivoted on the main frames maintain the proper relative position of the rear axle. The framing of the car is of rolled steel, 3 1-2 inches deep throughout, including the end members; angle iron re-enforcing strips are riveted inside the main frames, and cross-members of the same material support the ends of the longitudinal sub-frames to which the motor and transmission gearcase are attached.

Springs are all full elliptic, the rear springs, of the scroll end type, being 41 1-2 inches long, and the front springs, made without scroll ends, are 36 inches long. The



MOLINE MODEL C 18-20-HORSEPOWER, FOUR-CYLINDER LIGHT TOURING CAR FOR 1906.



IROQUOIS MODEL D 25-30-HORSEPOWER, FOUR-CYLINDER TOURING CAR, WITH EXPANDING CLUTCH AND SLIDING GEARS.

road wheels are all 32 inches in diameter and are fitted with 4-inch tires; Timken roller bearings are fitted to all the wheels as well as to the live rear axle. Wheelbase is 100 inches and tread 56 inches.

The steering column passes through the straight dashboard and spark and throttle levers work in sectors inside the wheel rim. All main bearings are lubricated by a force feed lubricator, located in front of the dashboard; sight glasses are attached to the left-hand side of the engine.

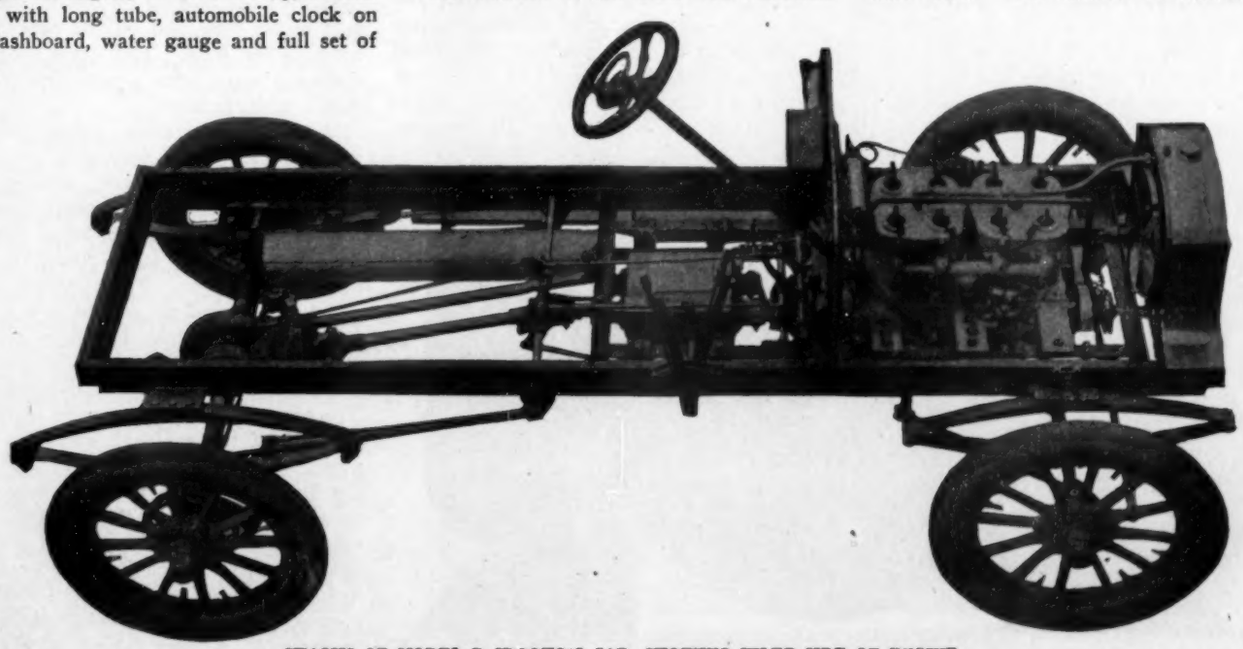
The body has the popular divided front seat and a rear seat roomy enough for three adults; the upholstering is of hand-buffed leather. The body is of wood and is finished in olive green with black moldings and wine-colored frame and running gear. The equipment of the car as sold is unusually complete, consisting of two oil side lamps, two gas headlights, an oil tail lamp, French horn with long tube, automobile clock on the dashboard, water gauge and full set of tools.

"American" Trucks.

In the accompanying engraving is shown a two-ton truck designed and built with especial view to transporting heavy castings, pipes and similar material over the rough and hilly roads in and around Lockport and Tonawanda, N. Y. Although designed for a load of two tons, it is successfully hauling as much as three and a half tons through heavy roads and up steep grades.

The engine has four vertical cylinders of 4 7-16 inches bore and 5 1-2 inches stroke. It is water cooled and the radiator contains 144 lineal feet of three-quarters-inch tubing. No fan is used. The steering gear is of the irreversible type, but of special design, and spark and throttle control levers are mounted on the steering wheel.

The builders of this truck—the American Motor Truck Company, of Lockport, N. Y.—realizing the objections to the sliding gear type of transmission for heavy industrial-vehicles, on which experienced chauffeurs are not likely to be employed, bent their efforts upon perfecting a suitable planetary transmission, with the result that they exceeded their own expectations, as they state, producing a gear that gives a speed range from two to twelve miles an hour and constant control of the vehicle. One of the claims made for it is that when changing from low to high speed the gear does not cause any sudden jerk on engine or car, either when light or fully loaded. A series of fiber discs in the high-speed clutch enables the clutch to take hold gradually, a certain amount of slippage occurring to prevent any sudden jerk. The gears used in this transmission are made of open hearth machine steel. The number of teeth varies



CHASSIS OF MODEL D IROQUOIS CAR, SHOWING INLET SIDE OF ENGINE

from eighteen to forty, of eight pitch and two-and-a-half-inch face. The gearing is designed and built with a view to long life.

A truck on similar lines to the foregoing, but of greater power, to be designated a three-ton truck, is to be regularly built for market and will be shown at the Chicago show in February. It will have a vertical four-cylinder engine of 5-inch bore and 6-inch stroke, with cylinders cast separately with integral jackets. Drop forged inlet and exhaust valves of 1 7-8 inches diameter are on the same side of the engine. By actual test this engine develops 32-36-brake horsepower, French rating. The pistons are of cast iron and the connecting rods of steel with bronze bushed bearings. The piston pin is 1 1-8 inches in diameter with 2 3-8-inch bearing, made of hammered machine steel. Four bearings support the crankshaft, three of them 2 3-4 inches long by 2 inches diameter and the fourth 4 inches long by 2 inches in diameter. Bearings are split on the horizontal and heavily babbitted, the babbit metal being hammered into place and bored. The flywheel, of heavy section 18 inches in diameter and with 4-inch face, is attached to a flange on the crankshaft by means of bolts carefully fitted in reamed holes. A 1-inch camshaft with three bearings is entirely enclosed in the crankcase, which is made of cast iron strongly ribbed, separating on a diagonal line, so that by removing the case cover the camshaft, connecting rods and crankshaft bearings are exposed to the greatest possible extent, great accessibility and ease of repair being thus secured. Aluminum is used for the crank housing cover for lightness in handling, and the cover is provided with a large glass peephole for conveniently inspecting the oil level. To prevent the oil from flowing to one end of the case, on hills and to insure uniform distribution of the lubricant, there are several ribs in the base of the casing. A drainage cock is provided for drawing of the oil when the cover is to be removed.

All parts of the engine are so designed and connected with dowels and lugs that if it becomes necessary to make any removals the parts can be replaced in perfect alignment.

TWO-TON "AMERICAN" STAKE TRUCK WITH FOUR-CYLINDER VERTICAL ENGINE.

Planetary change-speed gearing like that in the truck illustrated will be used. Drive will be by side chains of 3-4 inch width and 1 1-4 inch pitch, to 36-inch road wheels fitted with 5-inch tires. Four-inch tires will be fitted on the front wheels.

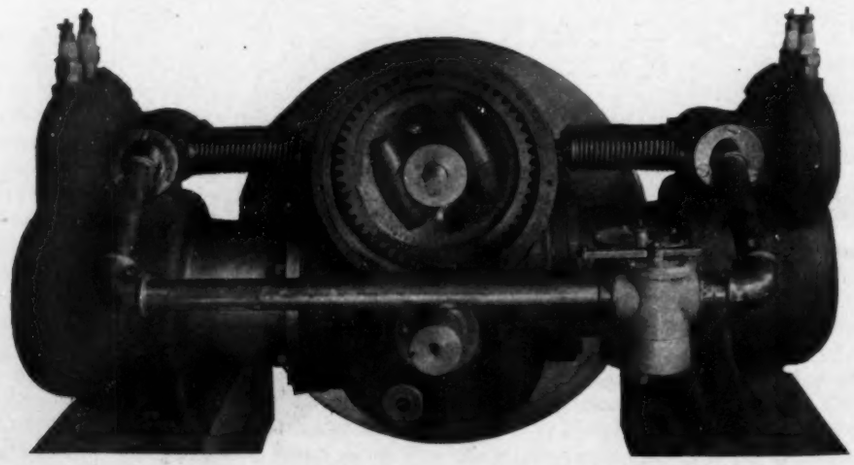
The lines of the new truck are to be somewhat neater than those of the wagon shown and the platform will measure 5 by 12 feet. The running gear is to be of standard tread.

Phillips Double Opposed Motor

The double-opposed cylinder governed motor illustrated and described herewith is designed for automobile work, and can be supplied with lugs for bolting to side frames for placing under the bonnet across the car, or with brackets for attaching to a subframe if the motor is placed under the body. The motor is rated at 12 horsepower and the makers state that it is suitable for cars weighing up to 1,800 pounds. The rated power is obtained at a speed of 1,125 revolutions a minute, when the piston speed is 750 feet a minute. Either sliding gear or planetary transmission can be supplied with the motor, or it can be obtained without either. The machine is manufactured by the Phillips Motor Works, of 131 La Salle street, Chicago.

The motor has double opposed cylinders of 4 1-2-inch bore and 4-inch stroke; the cylinders are offset in the usual way. Cylinder heads, water jackets and valve housings are cast integral; the valve housings are water jacketed. The crankcase is separate from the sylinders, which have flanges by which they are bolted to the case. The pistons are 5 inches long—an inch longer than the stroke. The connecting rods are 8 inches long and are cast of phosphor bronze; the crankpin bearings are of nickel babbitt and are 1 5-8 inches in diameter and 2 1-4 inches long, while the piston pin bearing is 1 inch in diameter and 2 1-4 inches long, bushed with phosphor bronze; the pin itself is made of Stubbs tool steel, ground. The crankshaft is 1 5-8 inches in diameter; the bearing on the flywheel side is 3 inches long and on the opposite side 2 1-2 inches long. The crank cheeks or slabs are heavy, being 1 inch thick and 2 1-4 inches wide, finished.

Valves, valve gearing, piping and spark plugs are all placed on top of the engine, where they can be easily reached. The valves are mechanically operated and are placed side by side; the usual inspection openings, closed by screw plugs, are placed opposite the valves. The camshaft gear, to which is attached the governor, is enclosed in a casing that can be easily removed; there is also a large opening in the top of the crankcase, closed by an aluminum plate. The removal of the gear casing permits the removal of the camshaft and with it the timing gear, governor and cams; the crankpin bearings can be adjusted through the opening in the top of the crankcase. The cams are of tempered tool steel and work against rollers 1 inch in diameter and 1-2 inch face, also of tempered tool steel. The pistons, connecting rods and crankshaft may be removed, without taking off the cylin-



PHILLIPS TWO-CYLINDER 12-14-HORSEPOWER MOTOR, WITH GOVERNOR CASE REMOVED.

ders, by removing the top half of the horizontally divided crankcase.

The governor is of the "fly-ball" type and is carried by the camshaft gear. The governor acts on the throttle through a sliding collar, a fork arrangd to oscillate a spindle placed at right angles to the camshaft, and a lever connected to the double throttle. The carbureter has a single float chamber and two mixing chambers, one for each cylinder, and a throttle valve is placed in each mixing chamber. A single rod connects the two valves, which are operated in unison by the governor. There are no springs on the governor inside the casing; there are two springs used, however, both being placed on the outside connections, between the governor and the throttle. The operator controls the speed of the motor by varying the tension of one of the springs; when the controlling lever has been set the governor keeps the engine running at the desired speed.

Four spark plugs are used, two to each cylinder, so that if for any reason one ceases to work properly the other will take up the work; both plugs work over a spark gap.

A gear, placed inside the crankcase, is fitted with a sleeve for attaching the water circulating pump, so that all the working parts of the motor are under cover and well lubricated.

By removing a plug in the end of either cylinder connections may be made with a pressure tank; the manufacturers state that with only a check valve and the necessary piping, a tank can be filled with air up to 75 pounds pressure. A special air pump can be supplied, to screw into the opening in the cylinder head, which will work up to a pressure of 200 pounds.

The total weight of the motor is 300 pounds, of which 102 pounds are in the flywheel; the flywheel is 17 inches in diameter, with webbed centre, and is finished all over. The overall length of the motor, from cylinder head to cylinder head, is 29 inches; total width, 17 inches; height from bottom of supports to top of timing gear case, 12 3-4 inches; distance from centre of crankshaft to bottom of crankcase, 4 5-8 inches. Water pipe connections are 3-4 inch.

A sliding gear transmission, giving three speeds and reverse with direct high gear drive, can be supplied with the motor on special order. The gear has a capacity for transmitting 20 horsepower; the control is by a single lever. Gears are of steel, hardened, and the casing is of aluminum. Total weight of transmission gear is 52 pounds; a steel hanger, weighing 8 pounds, can be supplied. The cone clutch, working into the flywheel, connects with the transmission gear through a shaft with flexible joint; weight of clutch, shaft and joint, 29 pounds.

A rather unusual feature in a motor of this type is that special attention is given to the exterior finish. The cylinders are rubbed, filed, finished smoothly and painted; flanges and cylinder necks, between the water jackets and the flanges, are machined and finished bright; piping is of polished brass. The cover plate on the top of the crankcase and the casing over the timing gear and the carbureter are of aluminum, the latter having polished brass mountings.

DISCUSSED TESTING METHODS.

More than a score of leading manufacturers were represented at the regular December meeting of the mechanical branch of the Association of Licensed Automobile Manufacturers, held last Friday at the association headquarters, at 7 East Forty-second street, New York. The regular subject up for discussion was the best methods of testing engines and cars before placing them on sale. Men in charge of the testing departments told of the methods in use in each of the factories, and from the all-day consideration of the matter it is believed that each factory has been put into possession of a knowledge of the best methods in vogue among all.

An even more important development of the meeting, which was presided over by Superintendent Coffin, of the Olds Motor Works, in the absence of Chairman A. L. Riker, of the Locomobile Company, was the reading of a report by Henry Souther, the A. L. A. M. laboratory expert, on the best grades of steel to be used for axles, springs and other parts, as shown by laboratory tests. The report gave detailed analyses of the metals, told the manner of their production, and gave practical hints as to how to work them with regard to their different qualities. Copies of this report are to be forwarded to all members of the association.

John A. Phelps, a flagman on the Chicago and Northwestern Overland Limited, has invented a separator for extracting sediment from gasoline. Phelps owns a gasoline hunting launch and he applied his own invention to the engine of his boat. He is now having made a model of his invention, and proposes to put it on the market.

DAVE HENNEN MORRIS, RECENTLY RE-ELECTED PRESIDENT OF THE AUTOMOBILE CLUB OF AMERICA, IN HIS 30-HORSEPOWER S. & M. SIMPLEX.

Letter Box

Auto Rigged for Hoisting.

Editor THE AUTOMOBILE:

[292.]—With this I am sending you a photograph of my auto rigged up as a hoisting machine. That is on week days; on Sundays we put on the regular body and take four or five passengers out for a pleasure spin. The machine is a steamer with a cylindrical gasoline fired boiler and an ordinary double cylinder link motion engine developing about 4 horsepower. The windlass attachment is carried on a special frame which is firmly clamped to the rear axle and driven by the sprocket chain which for the time being is removed from the driving sprocket of the car. The gear on the windlass gives a reduction of about 70 to 1 from the driving sprocket to the carved spool for the hoisting rope. I use the rig

AUTO RIGGED FOR HOISTING WORK.

chiefly for installing elevators. The windlass is jacked down from the elevator entrance, or it may be fastened in any convenient place to withstand the strain. The tackle I use is about 800 feet of 1 1-4-inch manila rope with a three sheave 10-inch pulley block and a two sheave 10-inch block, giving a leverage of 5 to 1. We generally run the engine with a boiler pressure of 50 pounds per square inch. The boiler is tested to 300 pounds. The boiler is fired with gasoline, and one man operates the entire affair.

With this auto hoist we have lifted 5,000 pounds 100 feet in forty minutes. In a recent installation of elevators at the John Deere Plow Works here, we lifted all the parts of two freight elevators—one a freight elevator of 5,000 pounds capacity and the other a passenger elevator of 2,000 pounds capacity—to the roof of a new eight-story building.

With the old hand method, it would take six men about six days to do the amount of work that one man can do in two days with the auto hoister.

When going out to a job, we load all the tackle and the windlass on the car, and it will carry the load to any part of St. Louis under its own steam. The fuel consumption in hoisting will average about five gallons of gasoline for 1 1-2 days' work.

A. A. STOLTZENBURG.

St. Louis, Mo.

Road Inspection Tour with Highway Commissioner MacDonald, of Connecticut.

Editor THE AUTOMOBILE:

[293.]—While attending a good roads convention at Lakewood, N. Y., last summer, I became interested in the man who had done more for the cause of good roads in this country than any other man of whom I know, with the possible exception of Henry Clay or Robert Gallatin, to whom the construction of the old National Pike was due; certainly he has done for his state—Connecticut—most thorough and fundamental work. He is the Hon. James MacDonald, State Highway Commissioner of Connecticut. Some states may have been able to reduce the interest rate; in Connecticut they reduce the grade and straighten curves of the highways, and I think this pioneer work might well be copied in other states. MacDonaldize the roads as well as macadamize them.

The promise was gladly given to accompany Mr. MacDonald to the actual workshop and inspect the transformation of old, crooked, hilly and hand-made roads, and in some cases merely rights of way, into beautiful, straight, broad, and, by comparison, level highways of machine-made precision, some with the final dressing of crushed stone, and others with the less expensive but, for the location, more suitable gravel surface.

The first work in the poorest districts is to take out the boulders. This has to be done anyway, whatever the nature of the future road surface, for even if the road is macadamized, any boulders in the sub-grade will cause an unequal compression and eventually necessitate repair at that point. You would be surprised to see how noticeable is the road with no stones, especially if the surface is a little soft. If a little more money is available, so that another stage of work can be undertaken, the shoulders of the road are pared down, the gutters cleaned out and culverts made. If there is yet more money to spend, the tops of the steep hills are graded down and the earth is used for filling in the road bed in the low places between the hills so as to reduce the grades, just as is done when grading for a railroad. Beside averaging the grade, important work is done in flattening out the curves and getting an unimpeded line of vision, having the overhead bridge abutments made parallel with the line of the road wherever they cross at an angle.

We inspected embankments over twenty feet high and one twenty-seven feet in height and more than a quarter of a mile long near Litchfield, which served both to cut down the steepest grade and straighten out a curve on the main highway through that part of the state. We drove along the shore of Long Island Sound to the quaint old town of Saybrook, whose main street is lined with stately elms, and had luncheon in a hotel more than 150 years old. We drove through the thinly settled portions of the state, through beautiful groves of tall pine trees, sighing in the wind far overhead and so still and quiet below that we felt a sense of delicious peacefulness as we glided along, and even stopped to more completely enjoy the charm of the place.

In many places the commissioner came upon work being done in a most improper way and soft, mouldy material being put in the road where it would rot out and leave a big hole. This was remedied at once by peremptory orders to the boss. At one place Commissioner MacDonald drove two miles off the road to shake hands with one of the supervisors. "You are the only man in the state," he said, "whom I ever knew to throw away the gutter wash." When material is worn out, new material with the necessary grit and bonding power should be spread on the road instead of simply increasing the amount of mud in the center of the road. If the commissioner had not been making an inspection by road, using the more customary railroad train, he would not have discovered the sort of work that was being done, and the places where the old, worn-out mud was being thrown back into the road would have become an increasing expense to the state and township. So it is safe to say that an inspection automobile is as important an item in the maintenance of good roads as a road roller.

In many places we stopped and talked with the local selectmen, all of whom knew the commissioner. One characteristic selectman, appointed as inspector to see that the specifications were carried out and to give the local farmers training in scientific road making, was smarting under his ignored protests to the contractor about the gutter line. "Gol durn him," he said, "I told him it warn't straight. It's so crooked, if a black snake tried to follow it he'd snap his darned tail off,"

Among the things to be considered in road building that are fully as important as the physical requirements, such as drainage, grade, alignment and surface, is the human element. First, the natural prejudice to any new idea or innovation must be overcome, then the farmers' coöperation must be enlisted, and, finally, matters must be so adjusted that all will realize some advantage. It is as hard, however, to make content the man whose house has been left high above the new road grade as it is to satisfy the old lady who sees an embankment with precipitous sides just in front of her door, and wonders how she is going to climb up on to

the highroad when the embankment is covered with ice and snow.

The distance we traveled was over 350 miles in five days. We went into nearly seventy townships and the commissioner made thirty-one actual inspections. The total cost of the trip was $15.05, including all charges for transportation, oil, gasoline, storage and washing, omitting only depreciation and wages, making a cost of $.0214 cents per passenger mile, as compared with a charge of $1.50 for a horse for each inspection, and say $10.00 railroad fares—possibly more—as the railroads do not cut across country, and two weeks, the ordinary time required to make the inspections because of time lost waiting for trains and in making connections. In fact, Commissioner MacDonald told me he had never seen so much of the state road system as a connected whole and never realized that it was possible to cover the whole state in such a short space of time.

AUGUSTUS POST.

New York City.

Four Cycle H. P. Formula.

Editor THE AUTOMOBILE:

[294.]—I send you a formula for rating gasoline engines. The formula is entirely empirical and I have found that the results obtained by it correspond very well with practice, and therefore I think it might be of general interest. The formula is:

$$P = \frac{R}{1000} \times S \times D \text{ 1-23; where}$$

P = horsepower developed
R = number of revolutions per minute
S = stroke in inches
D = diameter in inches.

In this shape the formula is for four-cylinder four-cycle engines, and its only drawback is the fact that it requires the use of logarithms, which, however, is not very serious, as every engineer is familiar with them.

C. P. S.

Cleveland, O.

An automobile is rigid economy compared with a wife.—Minnesota Paper.

Fred—I hear that measly little Timsel has become an automobilist. What car has he got?

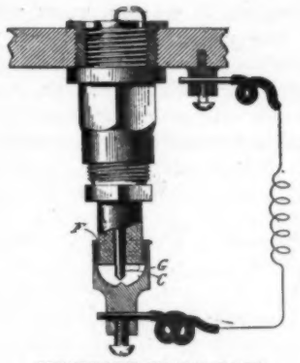
Tom—Not any. He just bought himself a leather suit, fur coat, etc., and joined the club.—*Exchange.*

Patents

Spark Plug.

No. 806,017.—C. F. Splitdorf, of New York City.

A plug having a binding post *G* in the form of a metal cap attached to the end of the porcelain, and with a spark gap between



SPLITDORF SPARK PLUG.

it and the insulated stem *C*. By threading the binding post on a sleeve *F* attached permanently to the porcelain, the length of the gap is adjustable and the porcelain can be cheaply replaced.

Engine Suspension.

No. 805,442.—F. H. Bogart, of New Britain, Conn.

A structure designed to avoid the necessity for a loose coupling between the engine and gear box by ensuring positive alignment between the two. To this end a base is built up, as indicated by *1 4 8 9* rigidly connecting them and forming the lower halves of the crankcase and gear box; and this is supported at four points *a b c d*, so that it will not be affected by distortion in the frame.

Rear Axle Construction.

No. 805,567.—T. J. Lindsay, of Indianapolis, Ind.

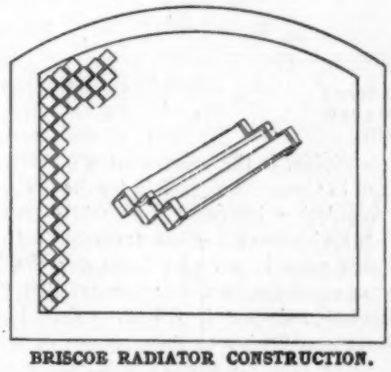
An axle so designed that the differential and attached parts can be taken out without disturbing the axle shafts which connect with the rear wheels. In the drawing, *14 15* are the axle shafts, and *G G* are short shafts integral with the main gears of the differential. These turn in sleeves on the differential shell, which is supported independently of *G G* by bearings *X X*. Connection between *G G* and *14 45* is made by the loose jaw couplings *17 17*, which are so formed (as shown in the detail sketch) that, when turned to the position shown, the differential with its bearings *X X* can be lifted out vertically. The casing *12 13* is split horizontally and the lower half is secured rigidly to the axle sleeves *10 11*.

Radiator Construction.

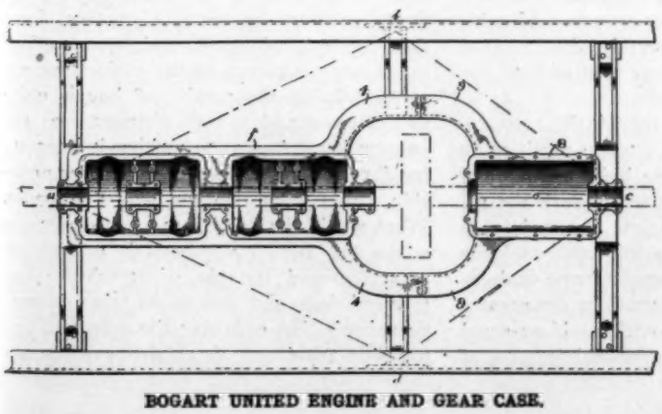
No. 804,926.—B. Briscoe, of Tarrytown, N. Y.

Instead of building up a honeycomb radiator of separate square tubes, having their ends expanded, so that water spaces will be provided between adjacent tubes, these tubes are stamped up in groups of two or three from sheet metal, as shown in the detail, thereby saving labor in assembling.

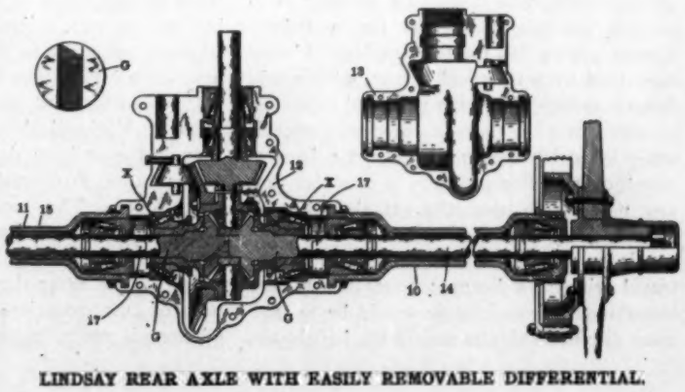
Although the number of autos owned and operated in Michigan is estimated at more than 5,000, only 2,935 licenses have been taken out to date under the law passed by the last legislature. The number of new licenses being issued is not large enough to more than keep up with the growing number of new owners. The law directs the sheriffs and police officials to see that no one operates an auto without first securing the necessary state license, and some steps may be taken toward compelling all owners in the state to comply with the requirements of the law.



BRISCOE RADIATOR CONSTRUCTION.



BOGART UNITED ENGINE AND GEAR CASE.



LINDSAY REAR AXLE WITH EASILY REMOVABLE DIFFERENTIAL.

THE AUTOMOBILE

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Federal License Bill. Edward Morrell, Member of Congress, capitalist and a resident of Philadelphia, is the sponsor of a bill introduced in Congress ostensibly for the purpose of regulating interstate automobile travel. The provisions of the bill are published on another page in a report from our Washington correspondent, which states that the proposed measure has been referred to committee. Owing to the pressure of serious work before Congress, it is highly improbable that the bill will be reported back during the present session. Of all the measures, local and state, that have been proposed for the regulation of automobile travel on the highways, this is certainly the most extraordinary, with, perhaps, the single exception of the humorous, though really ridiculous, Kansas law.

A superficial reading of the Morrell bill gives the impression that its purpose is to compel the tourist to take out a federal license, paying $50 for the privilege of being examined by a technical expert, who would draw a salary of $1,200 a year and expenses. A more careful analysis, however, reveals some inconsistencies that suggest a legislative "joker." For instance, it provides that any person violating the act shall be deprived of his license, while a violation of the act is to operate a machine in interstate travel without a license; consequently, the punishment of a violation would be to take away from the autoist something he did not possess—a federal license. In the first paragraph the bill provides that "On and after January 1, 1907," its provisions shall go into force, while it ends with the clause that the act is to take effect from and after its passage. And these discrepancies are quite outside of the fundamental question of constitutionality.

It is barely possible that the interests back of the bill may be seeking light on the subject and would welcome a visit of an influential automobile delegation with *power to act*. Certainly its sponsor, as an associate of the wise and good Matt Quay, and a Congressman of many terms, is not unfamiliar with legislative routine, and can make a fair estimate of the opposition this extraordinary measure will encounter.

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Appearances at National Shows. Preliminary announcements of the managers of the National shows for 1906 in New York and Chicago indicate that the coming year will mark a great change in the general appearance of the expositions. This is certainly a much-desired change and doubtless owes its beginning to the good example set in this country by the Importers' Salon in New York last season.

Expositions are chiefly valuable for their educational influence on the public, and the importance of a proper setting for an exhibit, singly or in the aggregate, is well understood by those expert in show management. It is especially necessary in an automobile show that something be done on the esthetic side of the problem, for at such a show the public is asked to pay entrance money to see that which it is expected to buy. In the ordinary place of entertainment, such as the theater, it is the spectacle itself that the visitor pays to see, whereas in the automobile show the admission fee is only a preliminary to a larger expenditure for the articles on exhibition.

Unfortunately the limitations of space in the available public buildings are such as to make it practically impossible to include certain features that would contribute to the entertainment and comfort of visitors. Of these the most serious loss is in ordinary seating capacity which would enable those who attend to rest in comfort in the intervals of sightseeing. Something in this way can be done, however, by individual exhibitors, though the familiar crowding of exhibition cars with spectators is often a cause of embarrassment to those who wish to examine the cars themselves.

It is within the power of the management of National shows to do much more than has ever been done before, and there seems to be no disposition to shirk the responsibility. The complete automobile in its varied colors and artistic outlines lends itself to any well-considered scheme of decoration. The better the machine the greater need of an appropriate setting. If an equal advance is made in the musical features at the several expositions and in the very ordinary and necessary convenience of adequate cloak rooms, there will be good reasons for congratulations all around.

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Nails on the Highway. Nails scattered on the roadway spoiled the last day's regularity run in the voiturette touring contest held by the Automobile Club of France in the vicinity of Paris, as reported in our foreign news pages. Of all dastardly acts aimed at users of automobiles, the scattering of nails on the roadway is perhaps the most despicable, for not only will sharp nails puncture pneumatic tires and disable a car, with possible dangerous results in the case of an inexperienced driver, but they are likely to cause the death of horses and other animals. No wound is more likely to prove fatal to a horse than that caused by a rusty nail picked up by its hoof in the road.

As a rule, those who are guilty of this crime against man and beast realize its despicable nature, and under cover of darkness, plant the roadway. Not so, however, in the case of the publishers of a farm paper called *The Gleaner*, published in Detroit, Mich., a center of automobile progress. In a recent issue of that paper, to which our attention has been called, the relation of the farmer and the automobile is commented upon, and the suggestion cold-bloodedly made that the rural telephone will prove a great aid to the farmer who wants to sow nails in the road. The article advises that "when a fellow comes along with a machine, causing runaways, passing with a grin, just telephone to the neighbor a mile down the road and tell him to trot out with a board filled with nails, lay it on the track, points up, and the 'dare devil' will soon come to grief." The farmer, it adds, can make it "mighty interesting" for the fellow who has no regards for the rights of others.

Doubtless the writer of this advice thought it a clever bit of play to the gallery, for further on in the article he admits that many drivers get excited at the sight of an automobile, thus exciting the beast and causing more trouble than had the driver remained calm.

We have no defense for the man in the automobile who disregards the rights of others. For his extinction there is always an adequate remedy at law in case damage is done. From personal experience, however, from the testimony of others, and from reading much correspondence on the subject, we are convinced that the rural road hog is quite as numerous and as well distributed as the automucker. And as to making it interesting for the other fellow, *The Gleaner* probably forgets that two can play that game. What would the publishers of this precious advice say were an automobile publication to recommend the use of strychnine for farmers' dogs, and violence to other domestic animals that endanger the safety of automobile travel on the highways—animals

that unaccompanied by any person have no rights whatever on the road other than humanity would suggest.

The publication of such stuff, if not an infraction of law, is at any rate a very serious mistake, and we do not doubt that the very persons it is aimed to please will be the first to denounce the infamous suggestion.

CIRCULAR TRACK ON THE ICE.

MINNEAPOLIS, Dec. 11.—A circular track for automobile racing on the surface of a frozen lake is the unique scheme now being considered by a number of Minneapolis autoists. In the park system of the city near the city limits is beautiful Lake Harriet. The plan is to build on the ice of this lake a circular cinder track sixty feet wide and about three miles in circumference.

Many owners of cars desire to have Saturday matinees on much the same plan as is followed by the turfmen who have an ice track across the lake in the winter. It is thought that some interesting automobile events could be run off.

An auction sale of automobiles was held at the Peerless Garage in West Forty-first street, New York, last week by the Auto Auction Association of America. A large number of cars, in apparently good condition, were displayed on the floor and there was a good attendance. Bidding was not very spirited, however, and it was not always possible to know whether a sale was really made or not, as the auctioneer did not declare the owner's price. Among the cars knocked down was an 18-28-horsepower 1904 Mercedes for $3,000, a 35-40-horsepower Peerless 1905 model for $2,250 and a Locomobile 22-horsepower 1904 model touring car for $1,600. Every lot was "sold as exhibited, without warranty." Another sale under the same auspices is announced for the show week in New York.

An inspection of the New York School of Automobile Engineers by members of the American Society of Mechanical Engineers took place last week during the meeting of the society in New York. In a recent issue we discussed at length the organization and objects of the school at 146 West Fifty-sixth street, and since then the machinery and special equipment have been installed. The various functions of ignition, carburation, cooling, and motors and driving gear are made plain to the students by actual working parts of well-known makers. This is supplemented, also, by complete cars, with and without bodies. One car mounted on rollers is run just as though it were on the road for the special purpose of demonstrating gear changes. The equipment was examined with great interest by the visitors who dropped in at their own convenience throughout the day.

Girls must learn to bear disappointment when out automobiling, for it is not a proposal when their escort gets down on his knees; it is only to crawl under the old machine.—*Exchange.*

Bill Empowering Interstate Commerce Commission to Issue Federal Automobile Licenses.

WASHINGTON, D. C., Dec. 11.—Automobilists throughout the country will be deeply interested in a bill introduced in Congress this week by Representative Morrell, of Pennsylvania, to regulate the operation of automobiles between the states.

In effect it provides that on and after January 1, 1907, it shall be unlawful for any person owning or operating an automobile or other motor vehicle, whether the motive power be electricity, steam, gasoline, or other source of energy, to operate the same for business or pleasure along the public highways of any state, territory, or dependency of the United States, or in the District of Columbia, so as to pass from one state into another state, territory, etc., without first passing a special technical examination as to his ability to control the machine with precision and safety, and obtaining a license or permit to operate such automobile between the states from the regular constituted authorities of the United States, as set out in the following section:

"That the Interstate Commerce Commission of the United States shall have power to conduct the examination prescribed by this act, under such rules and regulations as may be required, and shall appoint a technical expert to test the personal fitness, practical ability, and mechanical knowledge of any applicant, owner, or operator of any automobile or other motor vehicle as aforesaid, at such times and places as it may determine. Said technical expert shall be certified by the Civil Service Commission of the United States to the Interstate Commerce Commission, and shall receive a salary of $1,200 per annum and $4 per diem for expenses while absent from Washington in the necessary discharge of his duties."

The bill further prescribes that every owner or operator of an automobile who passes a satisfactory examination before the technical expert shall be licensed by the Interstate Commerce Commission to operate automobiles between the states and territories and the District of Columbia; and that such license shall be good for three years from the date of its issue, and may not be renewed without examination. Every owner or operator of any automobile who shall pass the required examination shall, before receiving his license or permit, pay into the United States Treasury the sum of $50.

Whenever it shall appear that any owner or operator of any automobile or other motor vehicle, so licensed to operate automobiles between the states, has been convicted on three several occasions in any federal, state, or municipal court of violating the act, or any state or municipal law governing automobiles, the Interstate Commerce Commission shall, after proper notification, cancel and revoke the license of said owner or operator and shall not reissue the same.

Any driver violating the provisions of the proposed law will be liable to a fine of not less than $500 nor more than $1,000, to be recovered in any district court of the United States in the district where the violation occurs. The act is to take effect from and after its passage.

This remarkable bill, which is numbered 385, has been referred to the House Committee on Interstate and Foreign Commerce. Its radical provisions will undoubtedly arouse the ire of every automobilist who has a fondness for touring, and automobile clubs and individual automobilists throughout the country will probably fight to the last ditch, if necessary, to prevent the enactment of Representative Morrell's drastic measure.

As a matter of fact, the Interstate Commerce Commission now has more than it can do to keep the railroads of the country in the straight and narrow path, and to place touring automobiles under its jurisdiction would about swamp the commission. The Morrell bill is simply the outcome of the "regulating" craze that has struck the Fifty-ninth Congress, and, like hundreds of other "regulating" measures, it bids fair to slumber in the files of the committee on interstate and foreign commerce.

PRAY FOR RELIEF.

Philadelphia Club Seeks to Enjoin City from Enforcing License Law

PHILADELPHIA, Dec. 11.—A bill in equity enjoining the city of Philadelphia and its officials from enforcing, on and after January 1 next, the provisions of the ordinance of December, 1902, relative to the issuing of automobile licenses, was filed in Common Pleas Court last Saturday by Attorney Ira J. Williams, on behalf of Secretary-Treasurer H. Bartol Brazier, Charles S. Wurts, Jr., and Samuel Y. Heubner, members of the A. C. of Philadelphia.

The bill sets forth in detail the diametrically opposite provisions of the city ordinance and those of the new state law, which goes into effect on January 1. The city law calls for one tag; the state measure for two. The city's Bureau of Boiler Inspection claims the right to issue licenses; so does the Automobile Bureau of the State's Highway Department. Different rates of speed are provided for by each law. The state law makes it a misdemeanor for an automobilist to carry on his vehicle any tags but the two issued by the state; the city ordinance says the municipal tag *must* be displayed, but does not bar others. State licenses cost $3; city licenses cost $2 the first year and $1 for every succeeding year.

A few weeks ago, in reply to a communication asking for an opinion, Attorney General Carson plainly stated that the State law superseded local laws, and concluded by saying: "Any attempt to carry a license tag not furnished by the Automobile Bureau of the State Highway Department is a direct violation of the law."

On the other hand, City Solicitor Kinsey of Philadelphia, says Mr. Carson is all wrong; that no automobiles will be allowed on the streets of Philadelphia unless they carry the city's license number. From Mr. Kinsey's viewpoint, it doesn't matter how many tags are carried, so long as one of them is secured from the proper city department—in this case the Bureau of Steam Boiler Inspection.

In order to save local automobilists from the annoyances to which they would be otherwise subjected, a temporary injunction is prayed for, to be made permanent if the court so decides.

A committee of the Philadelphia Trade Association is assisting the club officials in the matter.

The action is declared to be an amicable one, but as the city's Bureau of Boiler Inspection has taken in upwards of $5,000 from license fees on the $2 and $1 basis, it can be seen that the state, charging $3 for every license, has approximately $10,000 at stake, while to the city it means a loss of $7,500 at least if the court decides that the state law is paramount.

A peculiar feature of the matter is that local automobilists generally favor the state law, while motorcyclists, who under that measure are classed as automobiles, prefer the city ordinance. This state of affairs is mainly due to the provision of the state law which requires all motor vehicles to carry a rear light in addition to the usual headlight. The motorcyclists aver that a light so carried on a motorcycle will subject them to great danger in the event of a leak in the fuel tank, which in many types of motorcycles is carried in close proximity to the only place where a rear light could be affixed. In any event, the rider would be directly over such a light.

PROTESTED AGAINST ARRESTS.

CHICAGO, Dec. 9.—A party of members from the Austin Automobile Club appeared before the West Park Board of Commissioners recently to protest against the many arrests of automobilists that were being made on Washington Boulevard west of Garfield Park as a result of a petition presented by Rev. P. J. McDonnell, of the St. Mel's Roman Catholic Church. The petition was drawn up by a body of citizens after an accident to an old woman who was knocked down in front of St. Mel's Church, although it is shown by the records that the automobile was going at a slow rate of speed at the time.

Sydney S. Gorham, secretary of the Chicago Automobile Club, was with the party which visited the board, and he spoke in favor of allowing machines to travel at the rate of twenty miles an hour. He stated that he thought the time would come when the driver could use his own discretion as to what speed to use. Toward the close of his remarks he said that it was practically impossible to drive an automobile which was fitted with a powerful engine at a speed as low as ten miles an hour.

The commissioners held another view of the matter. President Eckhart said that the law in its letter must be obeyed. He compared automobiles with locomotives, which, he said, were forced to run on elevated tracks through the city, while automobiles did not even have flagmen.

"I do not think that ten miles an hour is unreasonable," continued Mr. Eckhart. "The time may come when people are more familiar with machines, and a high speed will not be as dangerous as it is now."

OWNERS' PROTECTIVE ASSOCIATION.

BOSTON, Dec. 11.—Another step in the campaign against the enforcement of the Massachusetts automobile law for purposes of revenue is announced with the first public statement of the Automobile Owners' Association. This is a new organization, at the head of which is Frederic Tudor, a prominent member of the Massachusetts Automobile Club and until recently an officer of the Bay State Automobile Association. The treasurer is John M. Graham and the counsel Francis Hurtubis, Jr.

The object of the association is "to protect owners of cars from unjust arrest, and also to prevent reckless and dangerous driving." In a statement which has just been issued the purposes of the association are set forth as follows:

"It is intended to try all complaints for alleged overspeeding, as well as to appeal such cases where proper; and the association will provide attorneys for so doing without cost to each member in excess of the annual dues. By this means it is hoped that towns shall be dissuaded from making indiscriminate arrests and deprived of the revenue which convictions in such cases produce, as in all cases appealed the fines go to the county and not to the town.

"It shall be the duty of each member of the association to see that his car is carefully operated, in order to manifest his desire to respect the rights of the public to the full enjoyment and use of the highways, and to dispel the prejudice existing against owners of automobiles.

"Only owners of automobiles in good standing will be admitted. The annual dues of membership shall be $10, payable in advance."

NEW LAW NEEDED IN DELAWARE.

WILMINGTON, Dec. 11.—Last Wednesday night a fine new automobile owned by John J. Satterthwaite was taken, in some mysterious way, from the garage in which the machine has been kept. It was located the next morning in Newcastle, disabled and abandoned, and was towed to this city, a distance of five miles. The police began an investigation and, as a result, have arrested a young white man on suspicion of being connected with the affair. If evidence warrants, he will probably be charged with larceny, in the absence of any other charge that will fit the case.

There is now a law making it a punishable offense for a person to drive off a horse without the consent of the owner, and it is likely that a similar law will be enacted with respect to the automobile.

OHIO STATE LAW WANTED.

CINCINNATI, Dec. 11.—An appeal is to be made to the Ohio legislature this winter to pass a new automobile law that shall provide for uniform speed limits throughout the state and by requiring a state license abolish the municipal license ordinances of this city and Cleveland and Toledo. The Cleveland and Columbus automobile clubs have agreed to join the Cincinnati club in the movement. Efforts are to be made to revive the Ohio Automobile Association and secure the coöperation of all automobile organizations in the state.

Plans are being perfected for the holding of a big meeting of Ohio automobilists in this city to discuss matters of common interest.

FIVE-MILE TRACK PROJECTED.

INDIANAPOLIS, Dec. 11.—A movement is on foot in Indiana, backed by prominent automobile people, to establish a five-mile automobile track in Indiana. It is planned to make the track one of the finest in the world.

Automobile manufacturers and dealers of this city have already subscribed $7,000, and the matter is now ready to be presented to the dealers and manufacturers throughout the state.

An effort was made to secure an option on the old horserace track at French Lick Springs, but it failed. It is thought now that the promoters will have to lease or purchase a tract of land and build the track. One of the men pushing the venture is Carl Fisher, an Indianapolis dealer and driver, who says that an attempt is being made to obtain a tract of about 800 acres. The track, he says, will be five miles in circumference.

Mr. Fisher, by the way, will enter five of the twenty-six Ormond races. He will drive a National car, which is now being built for him.

REGISTRATIONS IN INDIANAPOLIS.

INDIANAPOLIS, Dec. 9.—Although the season is well advanced toward winter, there seems to be no falling off in the registering of automobiles at the office of the City Controller. Figures given out at that office recently shaw that 363 cars have been registered in Indianapolis since January 1, 1905, and it seems possible that the number will reach 400 before the close of the year.

OFFERS THREE TOURING PRIZES.

BALTIMORE, Dec. 11.—J. H. Friedenwald, a prominent citizen of this city, who has been identified with amateur horse racing for many years, has offered to donate three beautiful cups as trophies for the winners of three automobile contests, whose general nature he has briefly outlined. The plan, as suggested, is more for endurance runs than for road races and the routes selected are as follows:

Baltimore to Washington and return; Baltimore to Gettysburg and return; Baltimore to Frederick, thence to Hagerstown and return.

Mr. Friedenwald stipulates that the entries must be touring cars, must carry five passengers each, and at least five cars must start in each event. He will furnish the timers, and the only expense to the contestants will be the cost of operating their machines.

The date for holding the contests will be left to the local automobile organization, which will undertake their management. Mr. Friedenwald hopes that his efforts will give a further stimulus to automobiling in Maryland.

NEW BAY STATE QUARTERS.

BOSTON, Dec. 11.—The Bay State Automobile Association will hold a house warming in its new quarters in Auburndale next Thursday. The association has been located for about a year at the Hotel Lenox, in Boston. Recently, however, it secured a part of a hotel in Auburndale and will use this for club rooms during the winter months. Connecting with the rooms which will be used for social purposes are bowling alleys and a billiard-room, and meals will be served by the hotel management. The hotel, The Woodland Park, is near the Newton boulevard, which is the main thoroughfare of automobile travel to and from the west and southern sections of the state.

WORCESTER CLUB'S RAPID GROWTH.

WORCESTER, MASS., Dec. 11.—The first meeting in the new rooms of the Worcester Automobile Club was that of the membership committee last week. A large number of names proposed for membership had to be acted upon. The list was so large that the membership limit had for the third time within the year to be increased half a hundred. Thirty-seven applications were reported upon favorably.

President John P. Coughlin, of the Worcester A. C., has invited President Speare, of the Bay State Association, to make this city the meeting place for the presidents of the seven Massachusetts clubs who are to be called together this month for a discussion of legislation.

BUFFALO CLUB TICKET.

BUFFALO, Dec. 11.—The annual meeting of the Automobile Club of Buffalo will be held in the club rooms on Monday evening, December 18, when the election of officers for the ensuing year will be held. Augustus F. Knoll, president during the past year, has declined a second term on the ground that business matters require all of his time. At a recent meeting of the board of directors the following ticket was nominated:

For president, H. A. Meldrum; for vice-president, F. B. Howard; for secretary, Dai H. Lewis; for treasurer, Charles Clifton; for board of directors, E. H. Butler, E. R. Thomas and Seymour P. White.

NEWS NOTES OF THE CLUBS.

CHICAGO.—It is practically certain now that a large number of members of the Chicago A. C. will attend the races at Ormond, Fla., in January, as Manager Charles A. Meade has received several applications from persons who want to make the trip. Two machines at least from Chicago will enter the races, as C. A. Coey has a big Thomas racer which he intends to take with him, and a large Premier of Ralph Temple's is also ready for the journey.

BUFFALO.—The annual meeting and banquet of the Buffalo Automobile Trade Association will be held in the rooms of the Automobile Club of Buffalo on Friday evening, December 15. The following ticket has been nominated: For president, J. A. Cramer; for vice-presidents, W. C. Jaynes and G. H. Poppenberg; for secretary, D. H. Lewis and John Frey; for treasurer, John J. Gibson; for executive committee, E. C. Bull, J. B. Eccleston, E. B. Dennison, N. P. Baker, P. W. Eigner, John Frey and Cal Paxton.

BROOKLYN, N. Y.—At the recent annual meeting of the Long Island Automobile Club, the following officers were elected to serve during 1906: President, Alfred Wilmarth; vice-president, Edwin Melvin; secretary, Walter G. Pierson; treasurer, Charles Jerome Edwards.

NEW YORK.—The annual meeting of the New York Motor Club will be held Thursday evening, December 14, at 8 P. M., in the rooms of the club. The nominating committee, in accordance with the constitution, has posted the following regular ticket to be voted for at that time: For president, W. J. P. Moore; for vice-president, H. M. Swetland; for second vice-president, R. H. Johnston; for secretary, A. B. Tucker; for treasurer, Frank J. Griffin. A board of directors will also be elected.

THOMAS OCCUPIES NEW PLANT.

BUFFALO, Dec. 11.—Without waiting for its completion, the E. R. Thomas Motor Company, of Buffalo, has occupied a part of its new factory. Rather than delay shipment, the mechanics were placed at their benches on the first floor of the new concrete building before all of the floor had been laid, and, while cars were being finished on the first floor the last touches were being put on the roof.

The new building is in the shape of an irregular L and is 190 feet by 195 feet, and three stories high. When the final work is done, it will be one of the finest automobile factories in the country.

Particular attention has been paid to the lighting arrangements, and when they are all in, the windows of the new plant will make it resemble a huge greenhouse.

New and improved machinery has been installed, and with the occupation of the new buildings, the plant will allow the use of the most up-to-date methods in every line.

It will be possible, as soon as the whole building is completed, to start the parts of an automobile down one row of benches on the first floor, and so make a circuit of the room, and when it comes back the chassis will be completed and an appreciable saving in time will be made.

COMING CHICAGO CHANGES.

CHICAGO, Dec. 11.—A number of changes will be made in the locations of automobile dealers in this city in the next few months. Among them are noted the following:

The Ford Motor Company will move on February 1 to its new building at 1444-46 Michigan avenue.

C. A. Coey will move on January 1 to his new headquarters at 1424-26 Michigan avenue. He will also open a new branch and garage at 1710-18 Indiana avenue on the same date.

The Greer Motor Car Company will move on May 1 to its new building at 1417-19 Michigan avenue.

On February 1 the McDuffee Automobile Company will move to its new building at 1501-5 Michigan avenue.

The Excelsior Supply Company will move on February 1 to its new building at 1436-38 Michigan avenue.

"Automobile Row" in Chicago presents a new appearance with all of these fine, new structures and shows the prosperity of the trade in this city.

RECENT INCORPORATIONS.

The Austin Auto Company, Newark, N. J.; capital, $25,000 Incorporators: Herbert Austin, Thomas G. French, Jr., Charles Krebs.

Birdsall Automobile Company, New York, capital, $10,000. Directors, E. T. Birdsall, W. T. Swazey, Jr., and E. C. Boyce.

Franklin Automobile Agency, New York; dealers in automobiles, etc.; capital, $500. Incorporators: Edward S. Griffing, George A. Burkhard, John D. Craig.

Metropolitan Auto Company, New York; manufacture automobiles, auto boats and vehicles; capital, $25,000. Incorporators: S. F. Randolph, J. M. Belin, H. H. Colbath.

St. Louis Motor Car Company, Peoria Heights, Ill.; capital, $100,000; manufacturing motor vehicles. Incorporators: M. A. Sattley, M. Eaton, M. M. Kelner.

C. A. Mezger, Inc., New York; manufacture motors, engines, machinery, etc.; capital, $5,000. Incorporators: Minnie Mezger, Raymond M. Owen and Zoe Owen.

Drake Electric Company, Chicago, Ill.; capital, $10,000; manufacturing auto and electric appliances. Incorporators: James M. Wilson, William Herrick, Frank E. Drake.

News and Trade Miscellany.

Two of Chicago's most enthusiastic autoists have decided to drive their own cars at the Ormond-Daytona races next month. Dr. H. E. Thomas will race his big Locomobile, which finished third in the Vanderbilt cup race with Tracy at the tiller, and C. A. Coey will drive a new Thomas Flyer which he has lately received from the factory.

An order for three twenty-eight-passenger auto 'buses and one five-passenger touring car has been received by the Knox Automobile Company, of Springfield, Mass., from the West Indies Transportation Company, of Havana, which has been using eight Knox cars in Cuba for the past year, with satisfaction and profit.

Two 8-10-horsepower single-cylinder Knox panel-top delivery wagons were delivered last week to W. M. Whitney & Co., an Albany clothing concern.

The Indianapolis Automobile Racing Association is planning for a number of race meets to be held next summer and fall. The recent meet, despite numerous postponements, was a greater success than anticipated, and Indianapolis enthusiasts expect to have some fast races next season. A meeting will be held in a few days to make further arrangements.

E. J. Pennington, of Chicago air shop and subsequent English war automobile fame, has bobbed up again in Toledo, where, it is understood, he is trying to organize a company to manufacture automobile parts after his own ideas, on which he holds patents. It is asserted that he is at present having machinery made for the manufacture of a new style ignition plug and has closed a contract with a local manufacturing concern for the manufacture of the plug. Mr. Pennington's last previous appearance in the automobile line was in Cleveland, where he induced a machine company to undertake the construction of a huge 208-horsepower road juggernaut with a locomotive "cow-catcher" in front. So far as is known, this never got so far as a successful test on the road.

Guy Vaughan, the race driver, has gone to Europe to visit his father in England, and while abroad will attend the Paris show and superintend the exportation of Decauville cars to be exhibited at the Madison Square Garden show.

At a recent meeting of the stockholders of the Midgley Manufacturing Company, of Columbus, O., the following officers were elected to serve during the ensuing year: Thomas Midgley, president; E. A. Cole, vice-president; C. S. M. Crumm, secretary; F. W. Flowers, treasurer and general manager.

Manager Durphey, of the Electric Vehicle Company, has established a chauffeurs' employment bureau in connection with his automobile business. By making a careful examination into the past experience and character of each applicant, Mr. Durphey hopes to eliminate many of the incompetent and careless chauffeurs. No charge is made to either chauffeurs or automobile owners for services of the bureau.

Ralph A. Coburn, formerly manager of the Randliff Motor Car Company, Boston, has accepted a position with the Morrison-Tyler Motor Car Company, Boston agents for the Maxwell cars.

The Deere-Clark Motor Car Company, a new concern recently incorporated in Moline, Ill., is now erecting its plant, and announces that it will place on the market a 22-horsepower, two-seated car, which will list at $2,000, to be known as the Deere. The company will have, in connection with its establishment, a half-mile testing track, on which new cars may be tried out before being offered on the market.

The new plant of the Wolverine Automobile and Commercial Vehicle Company, at Dundee, Mich., is now in operation. The main building is 48 by 135 feet and two stories high. The smaller building consists of a blacksmith shop, boiler room, electric light plant and testing room. Work has already been begun on the 1906 models. The company will make a specialty of the commercial vehicles and is turning out a roomy delivery wagon and a capacious truck. The company is employing 60 men at the start. The output for the first year is to be more than 250 machines. The officers of the company are: President, Fred Gradolph; vice-president, H. C. Spaulding; secretary, C. E. Stanger; treasurer, Seth Dixon.

After January 1 the Firestone Tire & Rubber Company, of Akron, will begin to push its new mechanically fastened pneumatic tire. The company, which has tripled its floor space the past year, will make a specialty of the pneumatic tire in addition to the solid rubber tires which it has been manufacturing on a large scale. The new tire will be manufactured under a patent originally taken out by H. A. Palmer, but the construction has been changed somewhat. The Firestone Company has increased its capital stock from $200,000 to $500,000 in order to secure more working capital.

The Torbensen Motor Car Company, of Bloomfield, N. J., has purchased the property at 610 Bloomfield avenue, and after alterations are completed to the present buildings, will occupy them in the manufacture of motors and gears for touring automobiles and trucks.

The Briscoe Manufacturing Company, of Detroit, Mich., makers of the well-known Briscoe honeycomb and flat tube radiators, has acquired the plant formerly occupied by the Wheeler Manufacturing Company, and which adjoins the Detroit factory of the Briscoe company. This acquisition gives the company 15,000 extra square feet of floor space and fills a long-felt want for more room in the plant.

Three new members have been enrolled in the Association of Licensed Automobile Manufacturers—the Matheson Motor Car Company, of Holyoke, Mass., the Walter Automobile Company, of New York and the De Dietrich Importing Company, of New York.

The Pontiac Motor Company, of Pontiac, Mich., has forwarded articles of incorporation to the secretary of state at Lansing. The capitalization is $25,000. Martin Halfpenny is the promotor, and among the stockholders are Pierre Buckley, J. E. McLintock and A. H. Burton, of Pontiac, and George E. Fisher, of Detroit. The company proposes to build a commercial car after a model by Mr. Halfpenny. The parts will be purchased outside the city and shipped there for assembling. The car will be equipped with the Halfpenny auxiliary spring, which has proved of great advantage on all cars to which it has been applied, it is said.

A meeting of the Flint, Mich., subscribers to the new Weston-Mott Company, to be organized in that city to succeed the Weston-Mott Company, of Utica, N. Y., which will locate there next summer and whose plant is now in course of construction, has been held for the purpose of making provision for a temporary board of directors, pending the organization of the new company under the laws of the state and the election of a permanent board of directors. J. D. Dort, C. M. Begole and J. J. Carton were chosen to act as a provisional board of directors. Charles S. Mott, president of the Weston-Mott Company, of Utica, was present.

J. Whitlock, a representative of the G & J Tire Company, of Indianapolis, is in Philadelphia looking up a good location for a branch store which is to be established about the first of the year.

The Standard Auto Company, of Detroit, Mich., agents for the Peerless and Packard cars, are temporarily located at 260 Jefferson avenue, pending the completion of a building now in course of erection on Woodward avenue. In one of our recent issues it was incorrectly stated that the Detroit Motor Car Company held the Detroit agencies for these two makes.

A part of New York city automobilists spent Saturday, December 9, in Bridgeport, as the guests of the Locomobile Company of America. John F. Plumer, Jr., New York manager of the Locomobile company, conducted the party to Bridgeport by private car over the N. Y., N. H. & H. R. R. On arriving at Bridgeport the party was taken to the Locomobile factory, where the day was spent in inspecting the plant.

The Joy Brothers' auto agency, of St. Paul, Minn., is preparing to ship a number of private automobiles to warmer climates for the winter. Some of the local enthusiasts will send their machines to Florida, while others will ship theirs to California.

The Peerless and Stevens-Duryea cars will have a much larger and more attractive home in Philadelphia next year. The Eastern Automobile Company, which handles those cars in the Quaker City and adjacent territory, has secured the building adjoining its present quarters and will have salesrooms and garage triple the size of the present ones.

Russell Huff, chief engineer of the Packard Motor Car Company, of Detroit, Mich., has gone to Europe to attend the Paris show, and, before returning to this country, will visit the leading European automobile centers.

The recently organized Babcock Electric Carriage Company, of Buffalo, N. Y., has taken over the business of the Buffalo Electric Carriage Company and has elected the following officers: President and general manager, F. A. Babcock; vice-president, F. L. Pabst; secretary and treasurer, E. R. Whitney.

The Dayton Motor Car Company, makers of the Stoddard-Dayton automobiles, announce their agencies in the principal cities as follows: New York, Stoddard-Dayton Agency, 1633 Broadway; Chicago, Ill., McDuffee Automobile Company; Philadelphia, Hamilton Automobile Company; Pittsburg, Central Automobile Company; Buffalo, N. Y., J. A. Cramer, 737 Main street; Boston, Randliff Motor Car Company, 24 Columbus avenue; St. Louis, Mo., Colonial Automobile Company, 3944 Olive street; Omaha, Neb., Deright Automobile Company, 1119 Farnam street; Cleveland, O., H. S. Moore, 160 Crawford Road; Toronto, Canada, Automobile and Supply Company, 24 Temperance street; California, H. W. Church, Hellman Building, Los Angeles; Minneapolis, Minn., Haynes Automobile Company, 220 South Sixth street; Denver, Colo., C. M. Wood; Indianapolis, Ind., Fisher Automobile Company, 330 North Illinois.

Police Commissioner Whelan, of Detroit, has placed two members of the mounted police squad in the downtown district of that city to capture reckless drivers.

R. R. Owen and a party of four from Cleveland made a trial trip from that city to Akron last Thursday in one of the first 1906 model Oldsmobiles shipped to Mr. Owen from the factory. Only two stops were made on the thirty-mile run, although the roads were in very bad condition, and in some places the mud was nearly hub deep. The 28-horsepower engine had to be kept at its highest speed to get through.

A. Auble, who represents a number of automobile manufacturers in Akron, O., has closed a contract to handle the Franklin machine for another year. He will shortly move into a larger and much more convenient garage. As the head of a large business he predicts a much larger general trade in autos this coming year, especially on account of the infatuation that women have for the pastime at present. Mr. Auble also represents the Oldsmobile.

The Albright Manufacturing Company, recently incorporated in Columbus, Ga., with a capital stock of $14,000, has leased a building containing about 15,000 square feet of floor space, which is now being equipped with machinery. The company announces its ability to fill all orders received promptly.

A garage and auto repair shop will soon be opened in Orlando, Fla., in the Cheney Building, corner Orange and Central avenues, by Buford Duke, who is well known in Orlando.

C. S. Longest, of Louisville, Ky., has purchased the property at 821 Third avenue, that city, on which he will erect a modern automobile house and garage.

The Johnstown Automobile Company has secured the agency for the Pope-Waverley line at Johnstown, Pa., for the coming season.

The Homewood Automobile Company is the title of the latest concern in the Pittsburg field. It is located at 7250-7252 Kelly street, East End, and will handle the Frayer-Miller air-cooled cars. One model is a four-cylinder 24-28-horsepower car and the other a six-cylinder car of from 36 to 40 horsepower.

The Motor Car Company, of Baltimore, has recently acquired the agency in Maryland for the Thomas Flyer and also of the Baker electrics.

The Rapid Motor Vehicle Company is now represented in Baltimore by Thomas E. Goodwin, who will sell the commercial wagons manufactured by this company.

The agency for the Mitchell cars in DeKalb, Ill., and vicinity has been taken by Sheets & Knodle, of DeKalb.

Daniel H. Scanlan, of Chicago, has taken the agency for the White steamer at Madison and Janesville, Wis., and will establish his headquarters at the former place.

C. H. Saunders, of Boston, formerly with the local Winton agency, has taken the agency for the Moline cars.

A. L. Bennett, formerly manager of the De Dietrich Company's Boston branch, has taken the position of assistant manager of the Mors Company in New York city.

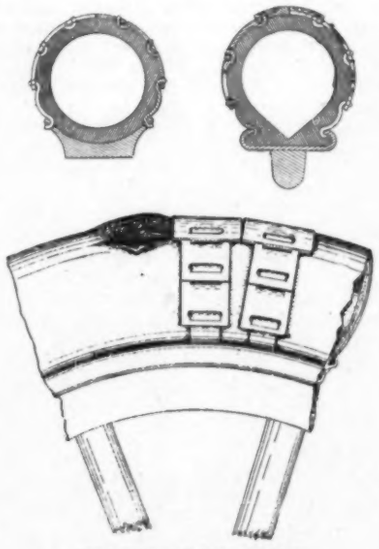
The Amazon Rubber Company, to which the local Board of Trade offered irresistible inducements, has signed a contract to locate its plant in Bedford, Pa. The concern employs more than 200 men in the manufacture of automobile and bicycle tires.

At the garage of the Keystone Motor Car Company, in Philadelphia, the E. H. Godshalk Company is exhibiting a 20-foot 5-horsepower boat which is an exact replica of the famous undefeated *Nada*. Despite her small size, *Nada Junior* is guaranteed to do fifteen nautical miles an hour.

INFORMATION FOR BUYERS.

WHEN LAYING UP.—It is extremely important that when the automobile is laid up for the winter, as most pleasure automobiles are, the parts liable to deterioration from rust or corrosion should be thoroughly protected. The Joseph Dixon Crucible Co., of Jersey City, N. J., recommends "Graphitoleo" for such work. Used as a dressing for exposed iron or steeel work, it prevents rust; a single coating will keep the parts protected through the winter. This compound is intended especially for the lubrication of gears, and the protection of exposed metal surfaces; it will render good service, however, as a chain lubricant and as a pipe joint "dope," though special graphite compounds are made for these purposes. Graphitoleo is a mixture of flake graphite of extreme fineness and smoothness, with vaseline.

TIRE PROTECTION.—A device that has for its object the protection of pneumatic tires from puncture and road wear, while permitting them to retain their elasticity, is the steel case manufactured by C. E. Kimball, of Council Bluffs, Iowa. This consists of a



KIMBALL TIRE PROTECTOR.

series of steel bands passing around the tire from edge to edge of the rim, the bands being made of linked pieces to permit the tire to give. The illustration shows the method of application; in the case of a crescent rim, holes must be punched in the rim to take the hooks in the ends of the bands. The links are joined by hooks, the hooks projecting outward slightly and forming calks which prevent the slipping of the tire on slippery road surfaces. About 50 bands are required for a 32-inch tire; each band is 2 inches wide at the tread plate and 1-8 inch thick, corrugated. If a complete covering of these plates is not required a few are convenient for covering and holding down blow-outs and other weak spots in the shoe. It is said that in a test a tire protected by a set of steel casings was run over a board driven full of nails, points uppermost, and over a miscellaneous collection of glass bottles and jugs which were crushed by the passage of the tire. The tire escaped without damage of any kind, while the nails were bent in all directions.

GILBERT FABRIC SUPPLIES.—To one who has not given the matter much thought it is at first surprising to discover how many things useful to the automobilist can be made of waterproof cloth. A catalogue recently issued by the Gilbert Mfg. Co., of New Haven, Conn., illustrates and describes a variety of specialties made of fabric proofed against water and weather and also of leather. Gilbert tire cases, consisting of close-fitting covers for spare tires, are already well-known to automobilists. The manufacturers state that these cases are so well adapted to their work that if properly put on they need not be removed when the car is being washed, as water will not enter. An extra fine tire casing is now made of a leather fabric. Each tire casing is accompanied by a waterproof bag made especially to hold inner tubes. Boots or coverings for steering-knuckles and universal joints are made of enameled duck or of leather, in various forms; when filled with grease and strapped in place these boots protect the parts from dirt and keep them well lubricated at the same time. Enameled duck and fabric leather are used to make tool rolls and are trimmed with a fine grade of chrome-tanned leather; they can be cleaned with gasoline if soiled. These rolls can be supplied with or without tools. Lamp covers, of fabric, are made for the various standard lamps on the market; sleeve protectors are made of rubber cloth. Leggings and puttees are made of leather and of fabric, in various styles, a specialty being a long legging for motorcyclists. Storm aprons for the protection of passengers in bad weather; waterproof covers to go over the entire car; light dust covers, and battery cell covers are among the products of the Gilbert Co. Tire irons are also furnished, complete with straps, for holding spare tires in place; also rawhide tire bands, for protecting weak places in tires.

STEEL STUDDED TIRES.—A steel studded non-skidding tire is the latest production of the Continental Caoutchouc Co., the American office of which is at 43 Warren street, New York. The new Continental tire does not make use of leather in any form; the walls, however, are made especially heavy by the use of extra layers of fabric; the tread in particular is very strong. The steel studs are vulcanized into the tire, and the layers of fabric prevent the inner ends of the studs from damaging the carcase. The manufacturers state that these tires have given excellent results in racing and other heavy work in Europe.

ZENT CARS.—A peculiar system of air-cooling is employed by the Zent Automobile Manufacturing Co., of Bellefontaine, Ohio, in the motors with which the Zent cars are equipped. Short metal tubes are inserted in the exterior walls of the cylinders by a special method; the inner ends of the tubes are split and opened so that air can pass through the tubes from end to end. The tubes are placed on the cylinders as closely as possible, with the result that a very large cooling area is secured. Three models are made; a touring car of either 18- or 24-horse power, a runabout of 14-horsepower and a delivery wagon of 18- or 24-horsepower. One of the engines used for the touring car will have three cylinders. Motors are located in front under the hood.

AUTOMOBILE ROBES.—A good automobile robe for cold weather must not only be of such texture as to retain heat, but it must be so arranged that it will not allow heat to "leak" past fastenings. A robe manufactured with this thought in mind has been placed on the market by the Chicago Auto Robe Supply Co., of 159 Market street, Chicago, and is called the Spring Belt robe. The spring belt, which is applied to a variety of robes, consists of a band

of spring steel an inch wide and a sixteenth of an inch thick, so formed as to clasp the body closely, yet lightly, when sprung into place, holding the robe close and preventing "leaks." These robes are made with two pockets, one for each foot, or with a single pocket for both feet, with opening at the back. The bottoms are made of pliable, though heavy, leather, through which the pedals may be felt.

BALL BEARINGS.—Ball bearings of the non-adjustable type are used with excellent results in many automobiles, even for such heavy work as is imposed by the transmission gear shafts, and in some cases crankshafts. The Hess-Bright Mfg. Co., of 245 North Broad street, Philadelphia, makes a specialty of bearings of this class; the company has commenced issuing a series of illustrated cards showing the various applications of these bearings; two recent cards show the ball-bearing crankshaft of a Hotchkiss 100-horsepower racing car, and a Martini transmission gearcase equipped throughout with ball bearings. The Hess-Bright Co. states that its bearings are made of special steels; the balls are hardened right through and are extremely accurate; that the bearings will run without seizing even if red-hot, and will bring the car home even if allowed to run absolutely dry; oiling is required only once or twice in a season.

NEW HARTFORD SUSPENSION.—A shock-absorbing device for automobiles that is well known to automobilists is the Hartford Suspension, manufactured by the Hartford Suspension Co., of 67 Vestry street, New York. This device, which consists of two arms, one attached to the frame of the car and the other to the axle, with a friction joint where the arms are joined to each other, has been improved by making the joint self-adjusting, so that wear will be automatically taken up on the road. The adjusting means consists of a five-pronged spring washer held in place against the joint by a split nut of special design. It is stated that the suspension, once placed on the car and properly adjusted to the weight of the machine, requires no further attention. One of the new Hartford suspension models will have one double arm and one single arm, making it impossible for one arm to shear off.

GEARS AND CHAINS.—Gears, chains and sprockets, components which may well be reckoned among the "vitals" of the automobile, are listed in Catalogue No. 5, recently issued by the Cullman Wheel Co., of 1022 Dunning street, Chicago. Sprockets are made in all sizes, for all sorts of chains, and are stocked regularly with from 6 to 50 teeth; sprockets having more than 50 teeth are made to order. A large stock of special sprockets for standard automobiles now on the market is carried; the company also carries in stock the Baldwin, Diamond and Whitney chains. Cullman spur gear differentials are made in three sizes, for chain or bevel gear drive. Gear cases are of malleable iron; gears of steel and hardened. Pinions are made integral with their shafts. The pinion shaft centers are hollow and are filled with cotton waste which absorbs oil and delivers it to the bearings as required. Special provision is made for retaining oil in the gear cases, and the manufacturers state that in hot weather, when oil gets thin, it will not leak out. There are four pairs of pinions; the bearings for the pinions are formed in the walls of the casing, and are not cut through.

COMPOUND TIRE PUMP.—A big automobile tire not only needs a large quantity of air, but that air must be compressed to a degree that necessitates hard work when the old-fashioned plain foot pump is used for inflation. A compound pump manufactured by Skinner & Skinner, 4133 Indiana avenue, Chicago, is made with two telescoping cylinders so arranged that the air moderately compressed in the larger cylinder is highly compressed in the small one. The large cylinder is 1 1-2 inches in diameter while the small cylinder is 7-8 inch in diameter. The entire pump is made of brass and has a removable wood handle. The manufacturers state that a pressure of 200 pounds can be obtained without difficulty, and that a 4-inch tire can be inflated in two minutes. No work is done on the pull up, the weight of the body doing all the work on the down stroke. The 1906 pump is practically the same as the 1905 model.

JERSEY BRAKE CO., Newark, N. J.—Circular illustrating and describing the well-known Searles automobile jacks for 1906.

NEW TRADE PUBLICATIONS.

AMERICAN LAVA CO., CHATTANOOGA, TENN.—Mailing card illustrating "Alco" lava tips for acetylene burners, made in all regular sizes; guaranteed for a year; sample sent free on request.

NATIONAL MOTOR VEHICLE CO., Indianapolis, Ind.—Circular illustrating and describing the National car, two models of which will be placed on the market for the 1906 trade.

COLEMAN, PROUTY & ROOT, Detroit, Mich.—Catalogue illustrating and describing a variety of automobile tops, both folding and canopy. Car covers, wind shields, storm fronts and tire cases are also manufactured by this concern.

HERMANN BOKER & CO., 103 DUANE STREET, NEW YORK.—Circular regarding Novo bolt threading dies. It is stated that one set of these dies threaded 40,000 three-quarter inch hard steel bolts at the rate of ten a minute; during this work the dies were not reground. The cutting speed was 46 1-2 feet a minute.

NATIONAL MOTOR VEHICLE CO., Indianapolis, Ind.—Circular illustrating and describing the National car, two models of which will be placed on the market for the 1906 trade.

FAULTY DICTION.—A little vest pocket book of reference entitled "Faulty Diction" has been issued by George W. Ogilvie & Co., 169 East Randolph street, Chicago. In its 150 pages many errors in everyday speech are noted and the correct form of expression supplied, the key words being arranged in alphabetical order for ready reference. Illustrating the comprehensive treatment that has been given the subject by the author, there are 1017 headings treated in the book, under some of which —"plurals" for instance—over fifty errors that are not at all unusual are to be found illustrated and corrected. This little book would undoubtedly be found useful among the reference books of any publicity department where the preparation of copy in good style is the objective. It is compiled by Thomas Russell, editor-in-chief of Webster's Dictionary. The price, in flexible cloth binding, is 25 cents postpaid.

INDEX TO ADVERTISERS

Aceteylene Gas Illuminating Co..... 50
Albright Mfg. Co..... 58
Am. Anti-Puncture Tire & Auto Co..... 54
American Coil Co..... 52
American Darracq Automobile Co.....Cover
American Lubricator Co..... 62
American Machine Mfg. Co..... 51
American Veneer Co..... 55
Anderson & Sons Co..... 53
Ashton Valve Co..... 49
Atwood Mfg. Co..... 77
Audel & Co., Theo..... 71
Auto Brass & Aluminum Co..... 53
Automobile Equipment Co..... 52
Automobile Supply Co..... 52

Badger Brass Mfg. Co..... 74
Baker Motor Vehicle Co..... 95
Baldwin Chain Mfg. Co..... 53
Ball-Fintze Co..... 64
Barcus & Co., Geo..... 53
Bartholomew Co..... 86
Bausch & Lomb Optical Co..... 76
Bay State Stamping Co..... 49
Beebe, A. M..... 60
Beilfuss Motor Co..... 72
Beverly Mfg. Co..... 57
Blomstrom Motor Car Co., C. H..... 110
Boker & Co., H..... 52
Borbein & Co., H. F..... 60
Boston Auto Gauge Co..... 67
Boston Cycle & Sundry Co..... 50
Bowser & Co., S. F..... 57
Briscoe Mfg. Co..... 50
Brown Mfg. Co., J. C..... 79
Buckeye Jack Mfg. Co..... 70
Buckeye Mfg. Co..... 87
Bullard Automatic Wrench Co.....Cover
Burgin Bros..... 51
Byrne-Kingston Co..... 68

Cadillac Automobile Co..... 98
Canedy, Earl..... 52
Capitol Foundry Co..... 53
Carbondale Chemical Co..... 50
Carr, F. S..... 67
Champion Co., Albert..... 62
Champion Mfg. Co..... 51
Chaney Mfg. Co., A..... 67
Chelsea Clock Co..... 49
Chicago & Northwestern Ry..... 49
Cleveland Motor Car Co..... 100
Clyde Line..... 55
Collins & Sons, G. A..... 60
Columbia Lubricants Co..... 62
Connecticut Tel. & Electric Co..... 49
Continental Caoutchouc Co..... 82
Continental Motor Mfg. Co..... 73
Corbin Motor Vehicle Corporation..... 108
Corcoran Bros. Co..... 76
Correspondence School Auto Engineering 63
Covert Mfg. Co..... 53
Crawford Automobile Co..... 87
Cullman Wheel Co..... 53
Cushing, J. M..... 62

Davis Mfg. Co..... 72
Dayton Electric Mfg. Co..... 51
Diamond Chain & Mfg. Co..... 53
Diamond Rubber Co..... 79
Dietz, R. E..... 74
Dixon Crucible Co., Joseph..... 51
Dow Portable Electric Co..... 52
Draper Bros. Co..... 49
Duplex Coil Co..... 59
Duquesne Construction Co..... 92

E. H. V. Co., The..... 93
Eastern Carbon Works..... 62
Eclipse Buggy Co..... 60
Edmunds & Jones Mfg. Co..... 54
Elbridge Electric Mfg. Co..... 64
Electric Storage Battery Co..... 57
Electric Vehicle Co..... 87
Elmore Mfg. Co..... 97
Excelsior Supply Co..... 49

Fairmount Engineering Works..... 49
Ford Motor Co..... 101
Ford & Dennen..... 49
Franklin Mfg. Co., H. H..... 105
Franklin Portable Crane & Hoist Co..... 72

& J Tire Co..... 83
Gabriel Horn Mfg. Co..... 62
Garage Equipment Co..... 52
Garford Co., The..... 61
Garlick Auto Prop Co..... 65
Gearless Transmission Co..... 69
Gilbert Mfg. Co..... 52
Goodrich Co., B. F.....Cover
Goodyear Tire & Rubber Co..... 81
Grand Hotel, The New..... 63
Gray-Hawley Mfg. Co..... 54
Grout Bros. Auto Co.....Cover

Ham Mfg. Co..... 76
Hardy Co., The R. E..... 51
Harris Oil Co., A. W.....Cover
Harrison Wagon Co..... 91
Hartford Machine Screw Co..... 53
Hartford Rubber Works..... 81
Hatcher Auto-Parts Co..... 57
Havemeyer Oil Co..... 49
Haynes Automobile Co..... 96
Heinze Electric Co..... 64
Herz & Co..... 57
Hoffman, Geo. W..... 50